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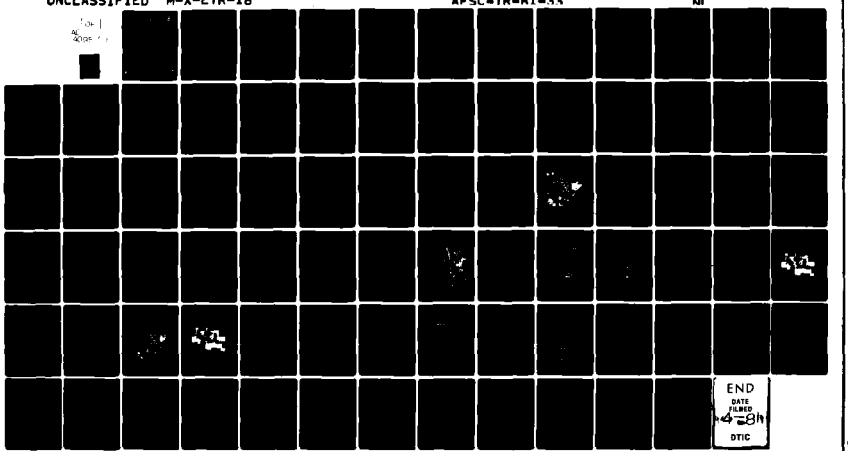

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M-X
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NATURAL AREAS

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Two types of land classes occur in both the Nevada/Utah and the Texas/New Mexico areas that are being studied for possible deployment of the M-X system. Wilderness areas, including areas now under review for possible additionals in the wilderness program, are areas legally excluded from M-X deployment. Significant natural areas include a variety of special designation areas such as national and state parks, monuments, grasslands, recreation areas, natural landmarks, wildlife refugees, and unique and nationally signifcant wildlife ecosystems as well as special use ares such as long term research areas of universities

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and government agencies. While not legally mandated, it is Air Force policy to avoid deployment of M-X system components in these areas to the maximum degree possible.

M-X ETR-18

ENVIRONMENTAL CHARACTERISTICS OF ALTERNATIVE DESIGNATED DEPLOYMENT AREAS: WILDERNESS AND SIGNIFICANT NATURAL AREAS

Prepared for

United States Air Force
Ballistic Missile Office
Norton Air Force Base
California

By

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Santa Barbara, California

22 December 1980

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INTRODUCTION

Two types of land classes occur in both the Nevada/Utah and the Texas/New Mexico areas that are being studied for possible deployment of the M-X system. Wilderness areas, including areas now under review for possible additions in the wilderness program, are areas legally excluded from M-X deployment. Significant natural areas include a variety of special designation areas such as national and state parks, monuments, grasslands, recreation areas, natural landmarks, wildlife refugees, and unique and nationally significant wildlife ecosystems as well as special use areas such as long term research areas of universities and government agencies. While not legally mandated, it is Air Force policy to avoid deployment of M-X system components in these areas to the maximum degree possible.

The National Wilderness Preservation System (NWPS), initiated under the Wilderness Act of 1964, currently consists of more than 19 million acres of land in the United States classified as wilderness within areas administered by such federal land-managing agencies as the Bureau of Land Management (BLM), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and National Park Service (NPS). Wilderness areas are roadless, primitive, unique natural areas of 5,000 or more contiguous acres of public land. A variety of interests from shepherds to scientists vie for use of the resources in wilderness areas (in 1979 areas administered by USFS received about 9.5 million visitor use days (Glenn, 1980)). The magnitude of the wilderness system, its current and projected use, and the controversy surrounding proposed additions to the wilderness system, make wilderness preservation a public issue.

The mandate to preserve wilderness is based upon a wide range of perceived societal benefits derived from the preservation of untouched wilderness resources. These benefits include:

- Preserving a sample of key ecosystems to ensure biotic diversity.
- Conserving gene pools and endangered ecosystems.
- Preserving natural areas for research and baseline ecosystem monitoring.
- Providing back-country recreation.
- Conserving wildlife and fish.
- Conserving scenic resources for tourism.
- Protecting a balanced land use pattern.

- Conserving a cultural heritage.

- Preserving aesthetic values.

- Providing educational opportunities.

All federal land-managing agencies are required to review the lands under their jurisdiction and to identify areas meeting the wilderness criteria set forth by the Wilderness Act (WA) of 1964 and the Federal Land Policy and Management Act (FLPMA) of 1976. The NPS, USFS, and USFWS have completed reviews of land under their jurisdiction and have identified areas for inclusion in the NWPS. The BLM is currently engaged in such a review.

The requisite characteristics to quality an area for wilderness status are:

- Roadless (no routes improved or maintained by mechanical means) (FLPMA, 1976).

- Contains 5,000 or more acres of contiguous public land (FLPMA, 1976)

- Natural: affected primarily by natural forces with man's impact essentially unnoticeable (WA, 1964).

- Primitive: opportunity for solitude and unconfined recreation (WA, 1964).

- Ecological, geological, scientific, educational, scenic, or historical factors (WA, 1964)

In January 1979, the U.S. Forest Service completed its wilderness identification program called Roadless Area Review and Evaluation II or "RARE II" as published in a Final Environmental Impact Statement. In these recommended areas, "no activities which might alter wilderness qualities of the land will be allowed, unless permitted by law or prior right, and entry for development purposes will be prohibited" (USFS, 1979). The NPS, USFWS, and USFS will have satisfied their mandates when congressional action on those roadless areas currently being reviewed is completed.

The BLM identification of wilderness areas is scheduled for completion in 1991. It has presently completed the intensive inventory phase and several areas have been designated as Wilderness Study Areas (WSAs) or have been recommended as WSAs. Although these areas are not designated wilderness areas, they are managed as such under the Interim Management Policy and Guidelines set forth by the Department of the Interior.

All BLM lands currently under review for incorporation into the NWPS will be managed as directed by FLPMA, Section 603(c); that is, "so as not to impair the suitability of such areas for preservation as wilderness," as prescribed in the Department of the Interior's Interim Policy and Guidelines for Lands Under Wilderness Review, (December 1979). The BLM is directed to prevent unnecessary or undue degradation of the lands and their resources, and to afford environmental protection. Mineral and grazing uses are allowed to continue in the manner in which they were being conducted on the date of approval of FLPMA (October 21, 1976). Examples of uses which would be incompatible with the Interim Management Guidelines include new utility corridors and power generating stations.

Prior to the passage of FLPMA in 1976, several areas on federal lands had been set aside as Research Natural Areas (RNAs) for scientific and educational purposes, and as Outstanding Natural Areas (ONAs) for recreation. As mandated by FLPMA all these previously designated natural areas were identified as Instant Study Areas (ISAs) and reevaluated for wilderness characteristics. In addition, there are several candidate Areas of Critical Environmental Concern (ACEC) under consideration by the BLM, These are, however, only recommendations and have no formal status. To date, only one has strong potential of being designated as ACEC and that is an upper Miocene fossile insect collection in Stewart Valley near Gabbs, Nevada.

"Significant natural areas" is a general term used here for areas set aside by various federal and state agencies to be managed and preserved for their unique ecological and/or geological characteristics. These include more than 70 proposed and designated National Natural Landmarks, seven National Wildlife Refuges/Ranges, four proposed Unique and Nationally Significant Wildlife Ecosystems, four National Parks/Monuments, and nine State Wildlife Management Areas, all within or near the Nevada/Utah M-X study area. Significant natural areas within or near the Texas/New Mexico M-X study area include two USFS managed National Grasslands, six National Wildlife Refuges, two National Monuments, and 14 National Natural Landmarks.

In the Nevada/Utah M-X study area the USFS and the BLM are the two major federal land-managing agencies. In the Texas/New Mexico study area most of the land is privately owned.

WILDERNESS - NEVADA/UTAH

Currently, Nevada and Utah have one designated wilderness area each, both administered by the USFS: Jarbidge in the Humboldt National Forest in northeastern Nevada, and Lone Peak in the Uinta and Wasatch National Forest of central Utah. Each of these areas is more than 60 miles from the MX system suitability zone and is not likely to be directly affected by the M-X project. Several roadless areas have been

proposed for wilderness status and several other areas have been administratively endorsed as additions to the NWPS. Those in the vicinity of the proposed deployment area are the Desert National Wildlife Range (USFWS), Bryce Canyon (NPS), Zion National Park (NPS), and Lake Mead National Recreation Area (NPS). Anaho Island in Pyramid Lake and Sheldon National Antelope Refuge in northwestern Nevada have been also recommended but are not likely to be directly affected by the project.

In both Nevada and Utah the Bureau of Land Management, which has completed the intensive inventory phase of the wilderness review, has recommended as Wilderness Study Areas approximately 1.6 million acres within the deployment area. These recommendations were released for a 90-day public comment period in April 1980 prior to the final WSA determination expected by mid-November 1980. Certain areas already have been intensively studied under special high priority project requirements such as land transfers, and energy projects, and either have been dropped from wilderness consideration or have been designated as WSAs.

The names, unit numbers, acreages, and current status (April 1980) of potential wilderness in the study area are presented on a hydrologic subunit basis in Table 1; data on location and size of these areas are mapped in Figure 1.

SIGNIFICANT NATURAL AREAS - NEVADA/UTAH

Several natural areas in Nevada and Utah have been identified by various federal and state agencies as areas to be managed and preserved for unique ecological and/or geological characteristics. These include proposed and designated Natural Landmarks (DOI, Heritage Conservation and Recreation Service, Division of Natural Landmarks); National Wildlife Refuges and Ranges (USFWS); Unique and Nationally Significant Wildlife Ecosystems (USFWS); National Parks and Monuments (NPS); State Wildlife Management Areas (Nevada Department of Wildlife and Utah Division of Wildlife Resources); and State Parks (Nevada and Utah State Parks Division). All are referred to in this report as "significant national areas." Table 2 lists all significant natural areas on a hydrologic subunit basis for the Nevada/Utah study area including their proposed or designated status, managing agency, and appropriate acreage. Figure 2 shows the locations of these areas.

The Natural Landmarks Program, previously managed by the NPS, is now under the Heritage Conservation and Recreation Service, Division of Natural Landmarks (DNL), in cooperation with the Division of State Parks in Nevada. Information on natural landmarks was obtained from a comprehensive study of the Great Basin (Bostick et al., 1975) and updated with information from DNL and Nevada Division of State Parks. These agencies

Table 1. Inventory of potential wilderness areas in and around the Nevada/ Utah study area (page 1 of 2).

HYDROLOGIC SUBUNIT		MANAGING AGENCY	WILDERNESS AREA		STATUS APRIL 1980	TOTAL WILDERNESS ACREAGE	APPROXIMATE PERCENT WILDERNESS ACREAGE IN WATERSHED	APPROXIMATE PERCENT WILDERNESS ACREAGE IN SUITABLE AREA
NUMBER	NAME		NAME	NUMBER				
3	Deep Creek	BLM	Deep Creek Mountains	UT-020-060/ UT-050-020	Designated WSA	68,910	30	< 5
4	Snake	BLM	Fish Springs	UT-050-127	Recommended WSA	68,900	20	< 5
		BLM	Conger Mountain	UT-050-035	Designated WSA	20,413	55	5
		BLM	Deep Creek Mountains	UT-020-060/ UT-050-020	Designated WSA	68,910	40	< 5
		BLM	King Top	UT-050-070	Designated WSA	84,771	40	0
		BLM	Wah Wah Mountains	UT-050-073	Recommended WSA	35,000	5	< 5
5	Pine	BLM	Wah Wah Mountains	UT-050-073	Recommended WSA	35,000	35	5
6	White	BLM	King Top	UT-050-070	Designated WSA	84,771	50	5
		BLM	Fish Springs	UT-050-127	Recommended WSA	68,900	20	< 5
			Notch Peak	UT-050-078	Designated WSA	51,130	25	< 5
			Howell Peak	UT-050-077	Designated WSA	23,825	55	15
			Conger Mountain	UT-050-035	Designated WSA	20,413	50	5
			Swasey Mountain	UT-050- 61	Recommended WSA	83,320	40	5
7	Fish Springs	BLM	Fish Springs	UT-050-127	Recommended WSA	68,900	60	10
		BLM	Swasey Mountain	UT-050- 61	Recommended WSA	83,320	20	< 5
8	Dugway	–	None	–	–	–	–	–
9	Government Creek	–	None	–	–	–	–	–
13	Rush	BLM	Big Hollow	UT-020-105	Recommended WSA	3,593	5	0
		USFS	Stanbury	4-757	Rare II Wilderness Recommendation	8,560	10	0
32B	Great Salt Lake/ Western Desert	BLM	Deep Creek Mountains	UT-020-060/ UT-050-020	Designated WSA	68,910	30	< 5
46	Sevier Desert	BLM	Swasey Mountain	UT-050-061	Recommended WSA	83,320	30	< 5
			Little Sahara	UT-050-186	Designated WSA	9,151	100	< 5
46A	Sevier Desert-Dry Lake	BLM	Howell Peak	UT-050-077	Designated WSA	23,825	70	< 5
			Notch Peak	UT-050-078	Designated WSA	51,130	70	< 5
47	Huntington	USFS	Ruby Mountains	4-367	Rare II Wilderness Recommendation	55,180	50	0
		BLM	Red Spring	NV-010-091	Designated WSA	6,400*	55	20
			Cedar Ridge	NV-010-088	Designated WSA	13,280*	98	50
50	Milford	–	None	–	–	–	–	–
52	Lund	–	None	–	–	–	–	–
53	Beryl Enterprise District (UT)	USFS	Pine Valley Mountain	4-251	Rare II Wilderness Recommendation	44,285	< 5	0
53	Pine (NV)	BLM	Roberts	NV-060-541	Recommended WSA	15,090	45	0
54	Wah Wah (UT)	BLM	Wah Wah Mountains	UT-050-073	Recommended WSA	35,000	85	< 5
54	Crescent (NV)	None	King Top	UT-050-070	Designated WSA	84,771	30	0
55	Carico Lake	–	None	–	–	–	–	–
56	Upper Reese River	USFS	Arc Dome	4-667	Rare II -Wilderness Recommendations	100,770	30	0
57	Antelope	None						
58	Middle Reese River		None	–	–	–	–	–
122	Gabbs	BLM	Gabbs Valley Range	NV-030-407	Recommended WSA	77,330	85	5
124	Fairview	None						
125	Stingaree	–	None	–	–	–	–	–
126	Cowick	BLM	Clan Alpine Mtns.	NV-030-102	Recommended WSA	193,520	10	0
127	Eastgate	BLM	Clan Alpine Mtns.	NV-030-102	Recommended WSA	193,520	5	0
			Desatoya Mountains	NV-030-110/ NV-060-288	Recommended WSA	48,150	30	0
128	Dixie	BLM	Job Peak	NV-030-127	Recommended WSA	92,330	50	< 5
			Stillwater Range	NV-030-104	Recommended WSA	110,133	80	5
			Clan Alpine Mountains	NV-030-102	Recommended WSA	193,520	65	10
129	Buena Vista	–	None	–	–	–	–	–
132	Jersey	–	None	–	–	–	–	–
133	Edwards Creek	BLM	Clan Alpine Mtns	NV-030-102	Recommended WSA	193,520	35	0
			Desatoya Mountains	NV-030-110/ NV-060-288	Recommended WSA	48,150	40	0
134	Smith Creek	BLM	Desatoya Mountains	NV-030-110/ NV-060-288	Recommended WSA	48,150	25	0
135	Ione	None	–	–	–	–	–	–
136	Monte Cristo	–	None	–	–	–	–	–
137A	Big Smokey	USFS	Arc Dome	4-667	Rare II Wilderness Recommendations	100,770	10	0
137B	Big Smokey North	USFS	Arc Dome	4-667	Rare II Wilderness Recommendations	100,770	60	< 5
138	Grass	–	None	–	–	–	–	–
139	Kobeh	BLM	Roberts	NV-060-541	Recommended WSA	15,090	25	0
140	Monitor	–	None	–	–	–	–	–
141	Ralston	–	None	–	–	–	–	–
142	Alkali Spring	–	None	–	–	–	–	–
143	Clayton	–	None	–	–	–	–	–
144	Lida	–	None	–	–	–	–	–
148	Cactus Flat	BLM	Kawich	NV-060-	Recommended WSA	27,560	60	< 5
149	Stone Cabin	BLM	Rawhide Mountain	NV-060-059	Recommended WSA	64,370	35	30
		BLM	Kawich	NV-060-019	Recommended WSA	27,560	30	< 5
150	Little Fish Lake	BLM	Antelope	NV-060-231/ NV-060-241	Recommended WSA	104,700	75	0
151	Antelope	BLM	Antelope	NV-060-231/ NV-050-241	Recommended WSA	104,700	< 5	0
152	Stevens	–	None	–	–	–	–	–
153	Diamond	–	None	–	–	–	–	–
154	Newark	–	None	–	–	–	–	–
155	Little Smokey	BLM	Antelope	NV-060-231/ NV-060-241	Recommended WSA	104,700	20	< 5
		BLM	Palisade Mesa	NV-060-142/ NV-060-162	Recommended WSA	99,550	10	0
		BLM	The Wall	NV-060-163	Recommended WSA	38,000	25	0
			Park Range	NV-040-154	Recommended WSA	42,300	25	20

Table 1. Inventory of potential wilderness areas in and around the Nevada/ Utah study area (page 2 of 2).

HYDROLOGIC SUBUNIT		MANAGING AGENCY	WILDERNESS AREA		STATUS APRIL 1980	TOTAL WILDERNESS ACREAGE	APPROXIMATE PERCENT WILDERNESS ACREAGE IN WATERSHED	APPROXIMATE PERCENT WILDERNESS ACREAGE IN SUITABLE AREA
NUMBER	NAME		NAME	NUMBER				
156	Hot Creek	BLM	Morey	NV-060-191	Recommended WSA	20,120	100	< 5
			Hawkhide Mountain	NV-060-059	Recommended WSA	64,370	70	5
			Palisade Mesa	NV-060-142/ NV-060-162	Recommended WSA	99,550	30	0
			South Reveille	NV-060-112	Recommended WSA	106,200	25	< 5
			Kawich	NV-060-019	Recommended WSA	27,560	35	< 5
			Antelope	NV-060-231/ NV-060-241	Recommended WSA	104,700	15	0
			Park Range	NV-040-154	Recommended WSA	42,300	75	0
169A	Tikaboo	USFWS	Desert National Wildlife Range	–	†	1,443,000	10	0
170	Penoyer	USFS	Quinn	4-360	Rare II Wilderness Recommendation	102,605	20	< 5
171	Coal	BLM	Weepah Spring	NV-040-246	Recommended WSA	69,400	35	15
172	Garden	USFS	Grant Range	4-371	Rare II Wilderness Recommendation	101,070	60	< 5
			Quinn Range	4-360	Rare II Wilderness Recommendation	102,605	30	< 5
173A	Railroad	BLM	South Reveille	NV-060-112	Recommended WSA	106,200	75	45
			Kawich	NV-060-019	Recommended WSA	27,560	2	< 5
173B	Railroad	BLM	Blue Eagle	NV-060-158/ NV-060-199	Recommended WSA	58,800	100	0
			The Wall	NV-060-163	Recommended WSA	38,000	75	40
			Palisade Mesa	NV-060-142/ NV-060-162	Recommended WSA	99,550	60	30
			Riordan's Well	NV-040-166	Recommended WSA	54,400	25	0
		USFS	Quinn Range	4-360	Rare II Wilderness Recommendation	102,605	50	0
		USFS	Grant Range	4-371	Rare II Wilderness Recommendation	101,070	30	0
174	Jakes	–	None	–	–	–	–	–
175	Long	–	None	–	–	–	–	–
176	Ruby	USFS	Ruby Mountains	4-367	Rare II Wilderness Recommendation	55,180	55	0
178	Butte	BLM	Goshute Canyon	NV-040-015	Recommended WSA	31,000	30	< 5
179	Steptoe	BLM	South Egan Range	NV-040-168	Designated WSA	46,000*	< 5	0
			Mt. Grafton	NV-040-169	Designated WSA	48,000*	15	0
			Goshute Canyon	NV-040-015	Recommended WSA	31,000	70	< 5
180	Cave	BLM	South Egan Range	NV-040-168	Designated WSA	46,000	40	< 5
			Mt. Grafton	NV-040-169	Designated WSA	48,000	60	5
			Far South Egans	NV-040-172	Designated WSA	46,000	60	20
181	Dry Lake	–	None	–	–	–	–	–
182	Delamar	BLM	Delamar Mountains	NV-050-0177 (IPP-07)	Designated WSA	126,257	15	10
			South Pahrocs/Hiko	NV-050-0132	Recommended WSA	28,600	15	0
183	Lake	BLM	Fortification Range	NV-040-177	Designated WSA	42,000*	80	35
			Mt. Grafton	NV-040-169	Designated WSA	48,000	45	< 5
184	Spring	BLM	Fortification Range	NV-040-177	Designated WSA	42,000*	20	< 5
185	Tippett	–	None	–	–	–	–	–
186A	Antelope	–	None	–	–	–	–	–
186B	Antelope	BLM	Goshute Peak	NV-010-033	Recommended WSA	88,440	20	10
187	Goshute	BLM	Goshute Peak	NV-010-033	Recommended WSA	88,440	30	20
			Bluebell	NV-010-027	Recommended WSA	63,150	60	15
194	Pleasant	–	None	–	–	–	–	–
196	Hamlin	BLM	White Rock Range	NV-040-202/ NV-[illegible]-216	Recommended WSA	19,100	40	0
			Table Mountain	NV-040-197	Recommended WSA	33,800	5	0
198	Dry	–	None	–	–	–	–	–
199	Rose	–	None	–	–	–	–	–
200	Eagle	–	None	–	–	–	–	–
201	Spring	BLM	Table Mountain	NV-040-197	Recommended WSA	33,800	40	0
			White Rock Range	NV-040-202/ UT-040-216	Recommended WSA	19,100	75	0
			Parsnip Peak	NV-040-206	Designated WSA	73,000*	45	0
202	Patterson	BLM	Parsnip Peak	NV-040-206	Designated WSA	73,000*	55	< 5
203	Panaca	–	None	–	–	–	–	–
204	Clover	BLM	Pennsylvania Canyon	NV-050-01R-18	Designated WSA	796*	< 5	0
			Grapevine Spring	NV-050-0139	Designated WSA	47,169		
205	Meadow Valley Wash	BLM	Pennsylvania Canyon	NV-050-01R-18	Designated WSA	796*	100	0
			Grapevine Spring	NV-050-0139	Designated WSA	47,169	95	0
			Meadow Valley Range	NV-050-0156	Designated WSA	310,201	75	5
			Mormon Mountains	NV-050-0161	Designated WSA	246,812	60	0
			Meadow Valley Range	NV-050-0156	Designated WSA	310,201*	15	10
206	Kane Springs	BLM	Delamar Mountains	NV-050-0177 (IPP-07)	Designated WSA	126,257*	23	0
			Meadow Valley Range	NV-050-0156	Designated WSA	310,201	25	0
207	White River	BLM	South Egan Range	NV-040-168	Designated WSA	46,000*	7	10
			Far South Egan Range	NV-040-172	Designated WSA	46,000*	40	10
			Riordan's Well	NV-040-166	Recommended WSA	54,400	75	13
			Grant Range	4-371	Rare II Wilderness Recommendation	101,070	15	0
208	Pahroc	BLM	Weepah Spring	NV-040-246	Recommended WSA	69,400	65	10
209	Pahranagat	USFWS	Desert National Wildlife Range	–	†	1,443,000	5	0
		BLM	East Pahranagat	NV-050-0131	Recommended WSA	16,200	90	0
			Hadsger Pass	NV-050-0154	Recommended WSA	11,462	100	0
			Lower Pahranagat Lake	NV-050-0165	Recommended WSA	3,350	100	0
			South Pahrocs/Hiko	NV-050-0132	Recommended WSA	28,600	75	< 5
210	Coyote Springs	USFWS	Desert National Wildlife Range	–	†	1,443,000	15	0
		BLM	Delamar Mountains	NV-050-177 (IPP-07)	Designated WSA	126,257*	70	10
			Fish & Wildlife #1	NV-050-0201	Designated WSA	10,535*	100	35
			Fish & Wildlife #2	NV-050-0216	Designated WSA	16,767*	100	20
			Fish & Wildlife #3	NV-050-0217	Designated WSA	22,002*	20	0
219	Muddy Springs	BLM	Arrow Canyon Range	NV-050-0215 (IPP-09)	Designated WSA	148,192*	65	0

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*BLM Inventory Decision—Public Land Administered by BLM Nevada (Bureau of Land Management Las Vegas, Nevada) Sept. 1979.

†Administratively Endorsed Wilderness Proposal.

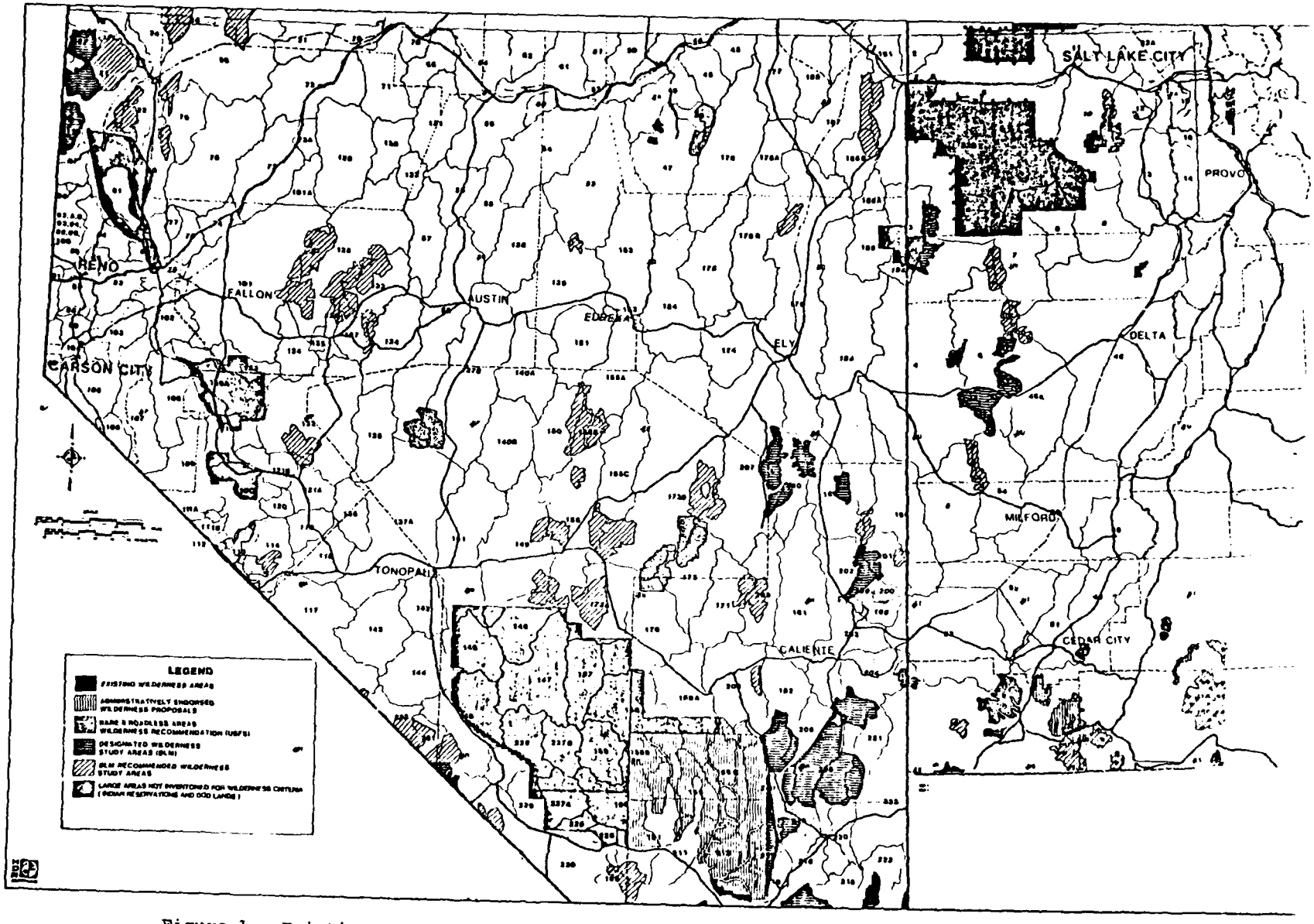

Figure 1. Existing and proposed wilderness areas in the Nevada/Utah study area.

Table 2. Inventory of significant natural areas in and around the Nevada/Utah study area (page 1 of 3).

HYDROLOGIC SUBUNIT		SIGNIFICANT NATURAL AREA (SNA)	STATUS APRIL 1980	MANAGING AGENCY	COUNTY	TOTAL ACREAGE	APPROXIMATE PERCENT SNA ACREAGE IN WATERSHED	APPROXIMATE PERCENT SNA ACREAGE IN SUITABLE AREA
NUMBER	NAME							
3	Deep Creek	None	–	–	–	–	–	–
4	Snake	Snake Range/Spring Valley Study Area[1]	P	NPS	White Pine	811,600	30	< 1
		Wheeler Peak Scenic Area[4]	•	USFS	White Pine	226,240	50	0
		Lehman Caves[1]	E	NPS	White Pine	640	100	0
		Lexington Arch[4]	•◇	USFS	White Pine	2,400	30	0
		Caves of Gandy Mountains[4]	■	BLM (Filmore)	Millard	1,280	100	85
		Desert Range Experimental Station	E	USFS	Millard	55,680	20	45
		Desert Range Experimental Station	E	USFS	Millard	55,680	80	< 5
5	Pine	None	–	–	–	–	–	–
6	White	None	–	–	–	–	–	–
7	Fish Springs	Fish Springs[2]	E	USFWS	Juab	17,992	100	0
		Fish Springs[4]	P(4B)	USFWS	Juab	17,992	100	0
8	Duguey Creek	None	–	–	–	–	–	–
9	Government Creek	None	–	–	–	–	–	–
13	Rush	None	–	–	–	–	–	–
32B	Great Salt Lake Desert	Fish Springs[2,4]	E	USFWS	Juab	17,992	7	< 5
46	Sevier Desert	Fumarole Butte[4]	■	BLM (Filmore)	Juab	1,920	100	0
		Antelope Springs Trilobite Bed[4,5]	•	BLM (Filmore)	Millard	2,560	20	< 5
46A	Sevier Desert-Dry Lake	Antelope Springs Trilobite Bed[4,5]	•	BLM (Filmore)	Millard	2,560	70	8
47	Huntington	None	–	–	–	–	–	–
50	Milford	None	–	–	–	–	–	–
52	Lund	Steamboat Mountain[4,5]	P(2C◇)	BLM (Cedar City)	Iron	7,860	100	< 5
		Steamboat Mountain[5]	E	BLM (Cedar City)	Washington	1,840	100	< 5
53	Pine	Roberts Mountains[4]	•◇	BLM (Battle Mtn)	Eureka	62,500	45	0
53	Beryl Enterprise District	None	–	–	–	–	–	–
54	Wah Wah	None	–	–	–	–	–	–
54	Crescent	Beowave Geysers[4]	■	Private	Eureka	640	80	50
55	Caribou	None	–	–	–	–	–	–
56	Upper Reese River	Arc Dome	•	USFS	Nye	41,000	40	0
57	Antelope	None	–	–	–	–	–	–
58	Middle Reese River	None	–	–	–	–	–	–
122	Gabbo	Fairview Peak Earthquake Scarps[4]	•	BLM (Carson City)	Churchill	3,500	30	0
124	Fairview	Fairview Peak Earthquake Scarps[4]	•	BLM (Carson City)	Churchill	3,500	10	0
125	Stingaree	Fairview Peak Earthquake Scarps[4]	•	BLM (Carson City)	Churchill	3,500	25	0
126	Cowkick	Fairview Peak Earthquake Scarps[4]	•	BLM (Carson City)	Churchill	3,500	30	0
127	Eastgate	None	–	–	–	–	–	–
128	Dixie	Fairview Peak Earthquake Scarps[4]	•	BLM (Carson City)	Churchill	3,500	5	0
129	Buena Vista	Star Windows[4]	P(3D)	BLM (Winnemucca)	Pershing	2,000	100	0
132	Jersey	None	–	–	–	–	–	–
133	Edwards Creek	None	–	–	–	–	–	–
134	Smith Creek	None	–	–	–	–	–	–
135	Ione	Icthyosaur Site[4,7]	••	USFS	Nye	200	100	0
136	Monte Cristo	None	–	–	–	–	–	–
137A	Big Smokey-Tonopah Flat	Arc Dome[4]	•	USFS	Nye	41,000	15	0
137B	Big Smokey-North	Arc Dome[4]	•	USFS	Nye	41,000	40	0
138	Gross	None	–	–	–	–	–	–
139	Kobeh	Roberts Mountains	•◇	BLM Battle Mtn.	Eureka	62,500	60	< 5
140	Monitor	Diana's Punchbowl[4]	•	Private	Nye	160	100	55
141	Ralston	None	–	–	–	–	–	–
142	Alkali Spring	Goldfield Joshua Grove[4]	P(4C)	BLM (Las Vegas)	Esmeralda	1,280	15	0
143	Clayton	Pinyon Joshua Transition	E	BLM (Las Vegas)	Nye	560	15	0
144	Lida	Goldfield Joshua Grove[4]	P(4C)	BLM (Las Vegas)	Nye	1,280	15	0
148	Cactus Flat	Nevada Wildhorse Range[4]	P(3A)	BLM	Nye	435,000	5	5
149	Stone Cabin	Hot Creek Range and Valley[4]	•	BLM (Battle Mtn)	Nye	10,680	5	< 5
150	Little Fish Lake	Hot Creek Range and Valley[4]	•	BLM (Battle Mtn)	Nye	10,680	5	0
151	Antelope	None	–	–	–	–	–	–
152	Steven's	None	–	–	–	–	–	–
153	Diamond	None	–	–	–	–	–	–
154	Newark	None	–	–	–	–	–	–
155	Little Smokey	Lunar Crater[4]	•◇	BLM (Battle Mtn)	Nye	2,560	100	0
156	Hot Creek	Hicks Station Mountain Meadow[4,5]	■	BLM (Battle Mtn)	Nye	22	100	0
		Morey Peak[4]	•	BLM (Battle Mtn)	Nye	23,680	95	0
		Hot Creek Range and Valley[4]	•	BLM (Battle Mtn)	Nye	266,440	90	35
169A	Tikapoo	None	–	–	–	–	–	–
170	Pancyer	Nevada Wildhorse Range[4]	P(3A)	USAF	Nye	435,000	4	0
171	Coal	None	–	–	–	–	–	–
172	Garden	Leviathan Cave[4]	•◇	BLM (Ely)	Lincoln	100	95	0
		Troy Peak-Hopper Canyon[4]	•◇	USFS	Nye	97,540	50	< 5
173A	Railroad	Nevada Wildhorse Range[4]	P(3A)	USAF	Nye	435,000	15	0
173B	Railroad	Railroad Valley[6]	E	BLM: NDF & G	Nye	14,720	100	< 5
		Lockes Ranch Spring[3]	P	Private	Nye	1,200	100	50
		Troy Peak-Hopper Canyon[4]	•◇	USFS	Nye	97,540	45	< 5
		Duckwater[4]	•◇	Private	North Nye	20	100	< 5
174	Jakes	None	–	–	–	–	–	–
175	Long	None	–	–	–	–	–	–
176	Ruby	Franklin Lake[4]	P(4B)	BLM (Elko)	Elko	8,000	100	< 5
		Ruby Lake[2,4,5] Ruby Valley Marsh[5] Ruby Marsh[4] Ruby Lake National Wildlife Refuge[2]	E*	USFWS	Elko, White Pine	37,631	100	40
		Ruby Mountains[4]	•	USFWS; Private	Elko	90,560	55	0
178A	Butte Valley North	None	–	–	–	–	–	–
178B	Butte Valley South	Heusser Mountain Bristle Cone Pine[4,5]	P(3C)	BLM (Ely)	White Pine	480	20	0

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Table 2. Inventory of significant natural areas in and around the Nevada/Utah study area (page 2 of 3).

NUMBER	NAME	SIGNIFICANT NATURAL AREA (SNA)	STATUS APRIL 1980	MANAGING AGENCY	COUNTY	TOTAL ACREAGE	APPROXIMATE PERCENT SNA ACREAGE IN WATERSHED	APPROXIMATE PERCENT SNA ACREAGE IN SUITABLE AREA
179	Steptoe	Goshute Cave[4]	P(4B)	BLM (Ely)	White Pine	640	100	80
		Goshute Canyon[5]	E	BLM (Ely)	White Pine	7,650	100	10
		Meuser Mountain Bristle Cone Pine[4,5]	P(3C)	BLM (Ely)	White Pine	480	80	0
		Hercules Gap[4]	P(3D)	BLM (Ely)	White Pine	640	100	0
180	Cave	Mount Grafton[4]	P(2B◇)	BLM (Ely)	Lincoln, White Pine	38,400	50	< 5
		Whipple Cave[4]	P(4C)	BLM (Ely)	Lincoln	640	100	0
181	Dry Lake	Highland Range[4]	■	BLM (Las Vegas)	Lincoln	23,000	40	0
182	Delamar	None	–	–	–	–	–	–
183	Lake	Mount Grafton[4]	P(2B◇)	BLM (Ely)	Lincoln, White Pine	38,400	50	< 5
		Snake Range/Spring Valley Study Area[1]	P	NPS	White Pine	811,600	< 5	< 1
184	Spring	Snake Range/Spring Valley Study Area[1]	P	NPS	White Pine	811,600	65	8
		Mount Moriah-Snake Range[4]	•	USFS, NPS, Private	Eastern White Pine	226,240	30	0
		Swamp Cedar[5]	E	BLM (Ely)	White Pine	9,020	100	0
		Spring Valley White Sage Flat[4]	P(2B◇)	BLM (Ely)	White Pine	1,820	100	0
		Shoshone Pygmy Sage[4,5]	■	BLM (Ely)	White Pine	20	100	0
		Spring Valley Swamp Cedar[4]	■	BLM (Ely)	White Pine	700	100	5
		Shoshone Ponds[5]	E	BLM (Ely)	White Pine	2,640	100	0
		Wheeler Peak Scenic Area[4]	•	USFS	White Pine	28,000	30	0
185	Tippett	None	–	–	–	–	–	–
186A	Antelope	None	–	–	–	–	–	–
186B	Antelope	None	–	–	–	–	–	–
187	Goshute	None	–	–	–	–	–	–
194	Pleasant	None	–	–	–	–	–	–
196	Hamlin	Snake Range/Spring Valley Study Area[1]	P	NPS	White Pine	811,600	< 5	0
		Wheeler Peak Scenic Area[4]	•	USFS	White Pine	28,000	5	0
		Lexington Arch[4]	•◇	USFS	White Pine	2,400	80	0
198	Dry	Gleason Canyon[4]	P(3B)	BLM (Ely)	Lincoln	11,040	100	0
		Big Spring Ecosystem[3]	P	?	Lincoln	600	90	0
199	Rose	None	–	–	–	–	–	–
200	Eagle	Spring Valley[7]	E	Nevada State Park System	Lincoln	1,630	50	0
201	Spring	Spring Valley[7]	E	Nevada State Park System	Lincoln	1,630	50	0
202	Patterson	Highland Range[4]	■	BLM (Las Vegas)	Lincoln	23,000	20	0
203	Panaca	Highland Range[4]	■	BLM (Las Vegas)	Lincoln	23,000	30	0
		Cathedral Gorge[4]	P(3C)	Nevada State Park System	Lincoln	1,58[illegible]	100	0
		Cathedral Gorge[7]	E	Nevada State Park System	Lincoln	1,608	100	0
204	Clover	None	–	–	–	–	–	–
205	Meadow	Kershaw-Ryan[7]	E	Nevada State Park System	Lincoln	240	100	
206	Kane Springs	None	–	–	–	–	–	–
207	White River	Preston Big Spring[4]		Private	White Pine	2	100	30
		Mormon Spring Fish Sanctuary[4]		Private	Nye	2	100	25
		Whipple Cave[4]	P(4C)	BLM (Ely)	Lincoln	640	40	0
		Wayne Kirch[4]	P(4B	NDF & G	Nye	3,360	100	20
		Wayne Kirch[6]	E	NDF & G, BLM	Nye	15,495	100	0
		Hot Creek Springs and Marsh[4]	••	NDF & G	Nye	20	100	10
208	Pahroc	None	–	–	–	–	–	–
209	Pahranagat	Pahranagat Valley Fish Sanctuaries[4]	■	BLM (Las Vegas)	Lincoln	9	100	0
		Key Pittman[6]	E	NDF & G	Lincoln	1,332	100	0
		Pahranagat Bonytail Ecosystem[3]	P	Private	Lincoln	4,700	100	0
		Pahranagat Lakes[2,4]	P(4A)	USFWS	Lincoln	1,800	100	0
210	Coyote Springs	Desert National Wildlife Range[2,4]	E P(1C◇)	USFWS	Clark, Lincoln	1,443,000	15	< 1
219	Muddy River Springs Area	Moapa Valley Fish Sanctuaries[4]	■	Private	Clark	1,520	90	35
		Moapa Valley[2]	E	USFWS	Clark	12	100	35

[1]National Park/Monument

[2]National Wildlife Refuge/Range

[3]Unique and Nationally Significant Wildlife Ecosystem

[4]Natural Landmark

[5]Natural Area

[6]State Wildlife Management Area

[7]State Park

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Inc. = Incomplete Information
E = Existing
P = Proposed
• = Nominated National Registry of Natural Landmarks
•• = Registered National Registry of Natural Landmarks
1 = Nationally significant
2 = May be nationally significant
3 = Possibly nationally significant but information lacking
4 = Not recommended
A = Serious impending danger
B = Some jeopardy
C = No apparent jeopardy
D = Jeopardy unknown
◇ = Decision deferred
■ = Local significance

Sources: Boetick and Niles, 1975; Federal Committee and Research Natural Areas, 1968; Directory of NRAs on Federal Lands of the USA, 1977; NQRS, 1980 personal communication; Riley, 1979; Nevada State Parks, 1977

Table 2. Inventory of significant natural areas in and around the Nevada/Utah study area (page 3 of 3).

HYDROLOGIC SUBUNIT		SIGNIFICANT NATURAL AREA (SNA)	STATUS APRIL 1980	MANAGING AGENCY	COUNTY	TOTAL ACREAGE	APPROXIMATE PERCENT SNA ACREAGE IN WATERSHED	APPROXIMATE PERCENT SNA ACREAGE IN SUITABLE AREA
NUMBER	NAME							
4	Snake	Mt. Moriah	1B		White Pine	120,000	70	5
5	Pine	Indian Peak[6]	—		—	10,240	100	0
32B	Great Salt Lake Desert	Bonneville Salt Flats[4,7]	1A		Tooele	36,480	100	0
46	Sevier Desert	Topaz[6]	—		—	4,143	100	0
		Clear Lake[6]	—		—	5,720	100	0
		Deer Habitat Management Area[6]	—		—	—	100	0
140	Monitor	Mt. Jefferson[4]	2C		Nye	3,490	100	0
150	Little Fish Lake	Morey Peak[4]	1C		Nye	23,360	5	0
203	Panaca	Big Spring[5]	—		—	—	50	0
207	White River	Troy Peak-Hooper Canyon[4]	1B		Nye	97,540	5	0
185	Tippett	Icthyosaur Site[4,7]	2C		Nye	200	100	0
137B	Big Smoky (North)	The Wild Granites[4]	—		—	11,000	50	0
56	Reese River	The Wild Granites[4]	—		—	11,000	50	0

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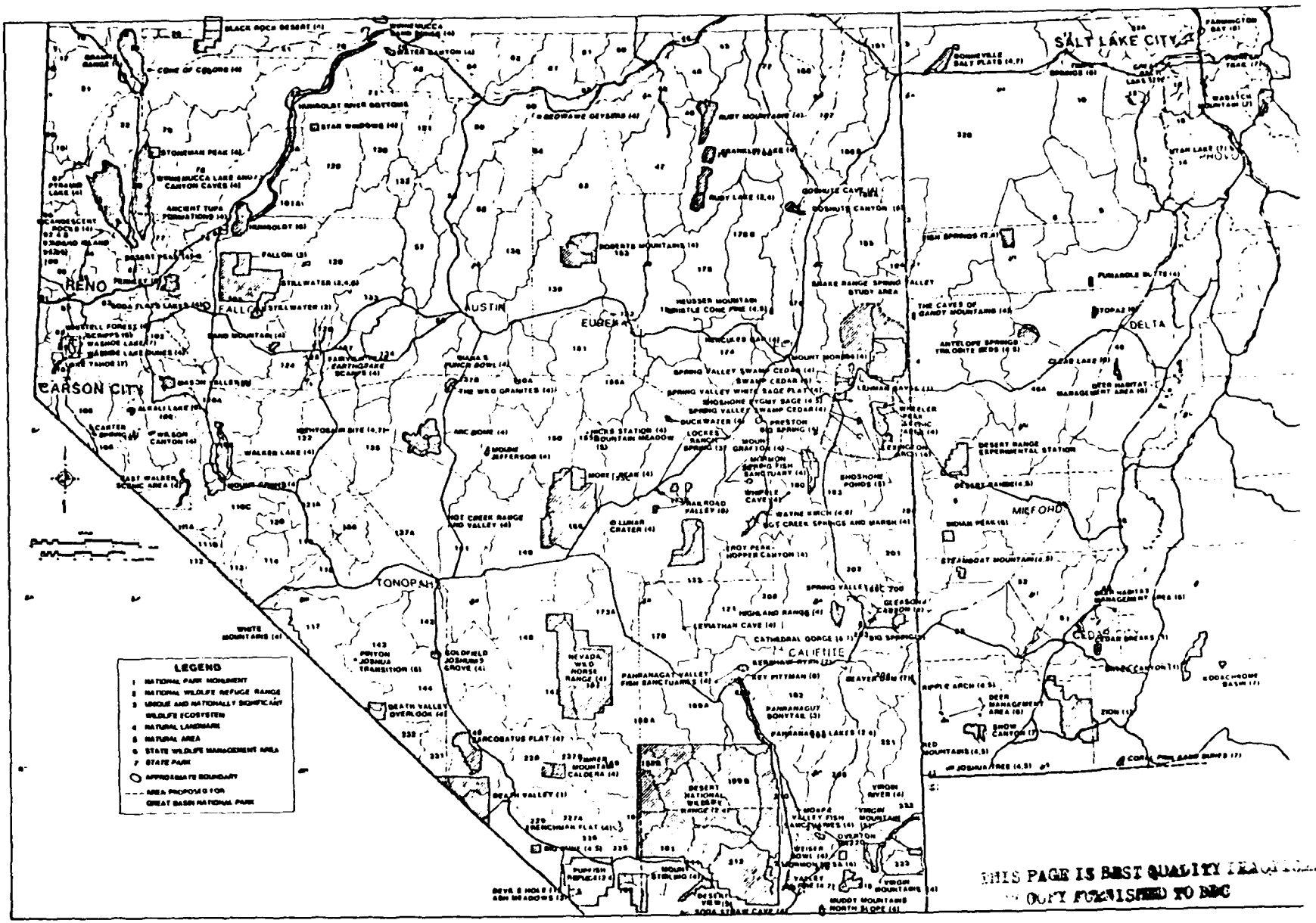

Figure 2. Locations of significant natural areas, Nevada/Utah study areas.

are currently conducting an inventory of proposed natural landmarks. Five such key natural areas in the Nevada/Utah study area are on the National Registry of Natural Landmarks. These include:

1. The Hot Creek Springs and Marsh in Nye County. The landmark is being considered for expansion to include the Wayne Kirch Wildlife Management Area. The springs and creek support a good population of the rare White River Springfish (Crenichthys baileyi), and the marsh is a haven for wildlife. The Nevada Department of Wildlife has fenced this area to provide a sanctuary for the rare fish.

2. The ichthyosaur site in the Toiyabe National Forest in Nye County is an outstanding fossil area where fossil remains of the Jurassic ichthyosaur have been found. The site is also a state park.

3. Lunar crater in the BLM Battle Mountain District is an outstanding geological feature about 3,800 ft across and 430 ft deep which covers more than 400 acres (BLM, 1979). The volcanic field surrounding it is proposed as a natural landmark for its lava flows, cinder cones, and numerous craters as well as the beautiful displays of wildflowers, particularly the showy scarlet globe mallow (Sphaeralcea spp.). It is currently managed by the BLM as a recreation area.

4. Valley of Fire near Las Vegas is a state park managed as a natural area for its unusual red rock formations and excellent examples of both Mojave Desert and Great Basin flora and fauna.

5. Joshua Tree Natural Area (BLM Cedar City District) located on bajadas along the southwest flank of the Beaver Dam Mountains in southern Washington County, Utah is the northernmost stand of tree yuccas in the United States. The area has also been set aside as a Research Natural Area by the BLM and is used for grazing.

Several other areas have been designated natural landmarks pending registration, and a large number are potential natural landmarks (recommended in natural history theme studies) pending further studies.

Two national parks, Zion and Bryce canyons in Utah, and two national monuments, Cedar Breaks in Utah and a small portion of Death Valley National Monument in southwestern Nevada, are located within 100 miles of the M-X study area. Although portions of all four had been recommended by the NPS for designation as wilderness areas by Congress, Cedar Breaks was dropped from further wilderness consideration because

of its small size. In addition, the NPS submitted a proposal for a Great Basin National Park in October of 1979. Four potential areas were studied and evaluated by the NPS in an August 1979 study. These were: Snake Range/Spring Valley, Railroad Valley, Monitor/Big Smoky, and White Mountains/Fish Lake Valley. The Snake Range/Spring Valley Study Area, an 811,600 acre parcel of land approximately 30 miles east of Ely in White Pine County, Nevada (see Figure 2) was selected for further study as the primary location for the proposed park.

The U.S. Fish and Wildlife Service has set aside several National Wildlife Refuges and Ranges, principally for preservation of wetland habitats for migratory waterfowl and/or nationally significant habitats of big game populations (see Table 2). The Pahranagat, Moapa Valley, and Ruby National Wildlife Refuges (NWR) located within the study area are potential candidated for increased recreational use. The refugees are also proposed natural landmarks and the Desert National Wildlife Range is administratively endorsed for wilderness area designation (i.e. it meets all criteria except final congressional action).

Four Unique and Nationally Significant Wildlife Ecosystems (UNSWE) in Nevada are being evaluated by the USFWS for inclusion in their system of public lands under the Land and Water Conservation Fund Act of 1965 (LWCF). The first, in Nye County, is Ash Meadows which harbors three endemic and protected pupfish, including the Devil's Hole pupfish. The second, also in Nye County, is the Lockes Ranch Park, a series of springs containing the Railroad Valley springfish. This site is also a nesting area for the white-faced ibis and the marsh hawk. An area in Pahranagat Valley near Hiko, Crystal, and Ash Springs, is being proposed as a unique ecosystem along with the Panaca Big Spring area in Meadow Valley Wash (Voekes, 1979). The three thermal springs in Pahranagat Valley have been designated as fish sanctuaries by the Nevada Department of Wildlife (Bostick, et al., 1975) and harbor the endangered Pahranagat roundtail chub (federal and state lists) as well as the threatened White River springfish and White River Speckled dace (state list). These headwater springs are also important migratory bird stopovers. Panaca Big Spring is the ancestral habitat of the Big Springs spinedace.

In addition to the above-mentioned natural areas under federal management, there are several state-owned and/or operated wildlife management areas and state park recreation areas (see Figure 2).

Finally, environmentally sensitive areas are long-term active research sites being used by universities and federal agencies. Preliminary investigation has revealed the existence of several such scientific study areas in the prospective deployment region. A complete inventory of these research areas (RAs) is in progress. A partial list of RAs in the study area includes Utah State University's Tintic Research Station as well as seven long-term research sites

administered by the USFS Desert Range Experiment Station in the Western Utah/Nevada region: Ecks Knoll, Ibex, Snake Valley, Middle Mountain, Warne Point, Wood's Well and the Pine Valley study area. In addition there are ten study areas on BLM land: Conner's Station, Ward Mountain, Neward #1 and #2, Warm Springs #1 and #2, Baker, Mullen Gap, Warm Springs Valley, and Desert Creek. Further long-term research sites would include the Benmore Research Area and the Indian Peak Game Management Area.

WILDERNESS - TEXAS/NEW MEXICO

One designated and two potential wilderness areas are located in the New Mexico portion of the Texas/New Mexico study area. These are the USFWS managed Salt Creek Wilderness Area within the Bitter Lake National Wildlife Refuge, and the BLM designated Sabinosa and Mescalero Sands Wilderness Study Areas (Figure 3).

SIGNIFICANT NATURAL AREAS - TEXAS/NEW MEXICO

As in Nevada and Utah, various federal and state agencies in Texas and New Mexico have identified unique undisturbed ecosystems and sites of geologic interest to be managed and preserved for their natural qualities. These are collectively termed "significant natural areas" and, with the inclusion of the USFS-managed National Grasslands, fall into the same categories as previously discussed in the section on Nevada/Utah. Tables 3 and 4 list significant natural areas in Texas and New Mexico, their proposed or designated status, the managing agency, and acreage. Figure 3 shows the locations of these areas.

PRINCIPAL IMPACTS TO WILDERNESS: EVALUATION OF PROJECT ALTERNATIVES

IMPACT ANALYSIS

Wilderness areas are generally established to protect the natural environments of plant and animal populations, preserve genetic resources contained in rare ecosystems, and serve as sources of baseline data on undisturbed ecosystems. Their principal use, however, is in providing low density, back country recreational experiences (Irland, 1979). Increasing demand coupled with limited opportunities for expansion of the supply has created conditions in many areas that make the preservation of "wilderness character" extremely difficult. A salient feature of the Great Basin region, identified in the SCOPING process (BLM, 1980), is the wide vista imparting a sense of open space, the last frontier, and associated qualities - important descriptions and components of wilderness in the eyes of many, particularly of this region. M-X deployment with its attendant visual and noise pollution as well as increased numbers of people in an area that is now primarily wildland, is expected to diminish the biophysical resource values characteristic of the Great Basin wildlands.

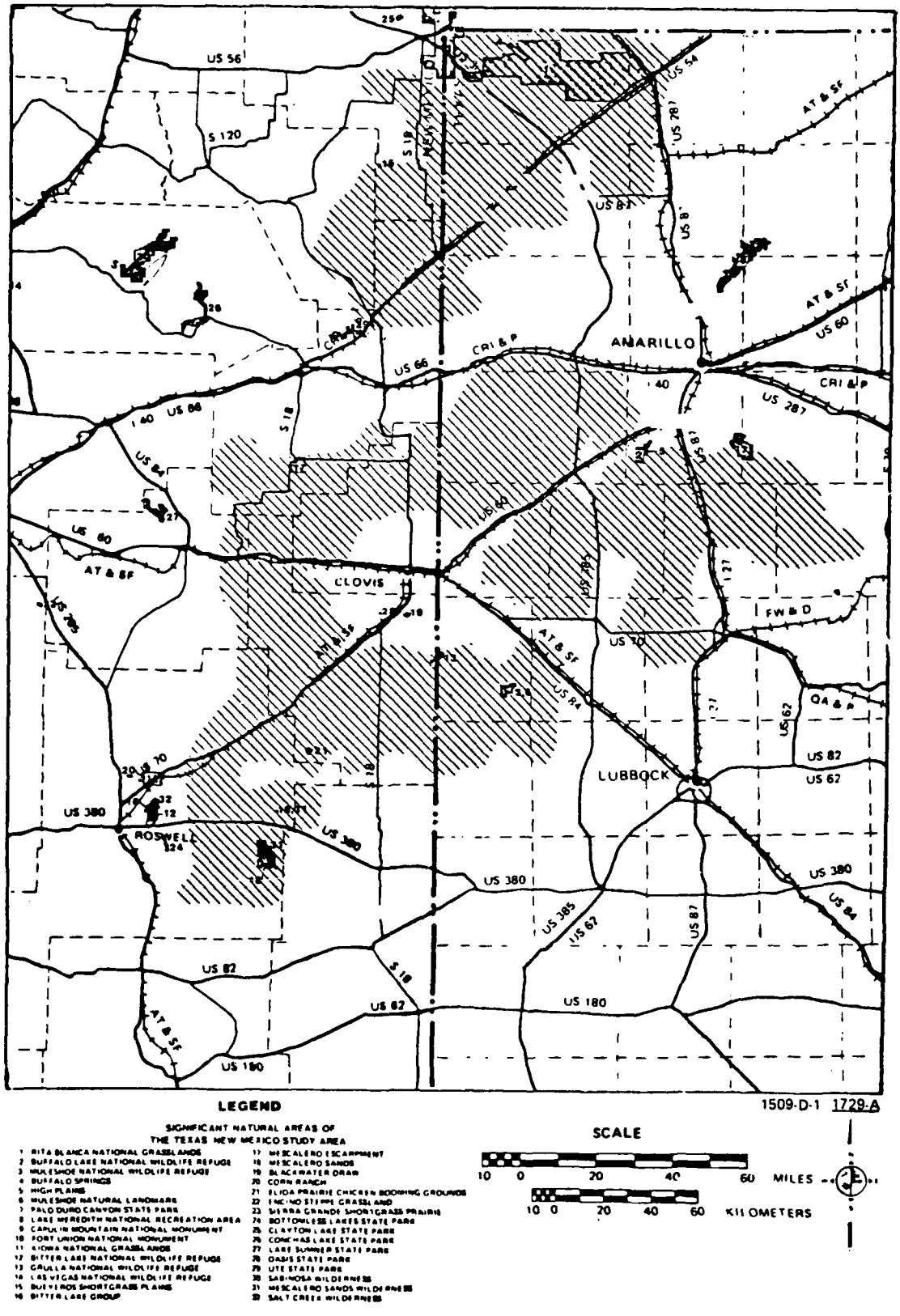

Figure 3. Existing and proposed wilderness and significant natural areas, Texas/New Mexico study area.

Table 3. Inventory of significant natural areas, Texas study area.

SIGNIFICANT NATURAL AREAS	ACREAGE	MANAGING AGENCY	COUNTY	STATUS
National Parks and Recreation Areas				
Lake Meredith National Recreation Area	45,964	USNPS	Potter, Moore, Hutchinson	E
National Forests and Grasslands				
Rita Blanca National Grasslands	70,000[1]	USFS	Dallam	E
National Wildlife Refuges				
Buffalo Lake National Wildlife Refuge	8,000	USFWS	Randall	E
Muleshoe National Wildlife Refuge	5,650	USFWS	Bailey	E
Natural Landmarks				
Buffalo Springs	364	Private	Dallam	P
High Plains[2]	175	USFWS	Randall	E
Muleshoe National Wildlife Refuge (see above)	5,650	USFWS	Bailey	E
Palo Duro Canyon State Park[3]	16,465	Texas Parks & Wildlife Dept	Randall, Armstrong	P
State Parks				
Palo Duro Canyon State Park (see above)	16,465	Texas Parks & Wildlife Dept	Randall, Armstrong	E

867

E = existing.

P = proposed.

[1]Approximate area - actually a patchwork of public and private lands.

[2]Part of Buffalo Lake NWR.

[3]Same as state park.

Table 4. Inventory of key natural areas, New Mexico study area.

SIGNIFICANT NATURAL AREAS	ACREAGE	MANAGING AGENCY	COUNTY	STATUS
National Parks and Monuments				
Capulin Mountain National Monument	775	USNPS	Union	E
Fort Union National Monument	721	USNPS	Mora	E
National Forests and Grasslands				
Kiowa National Grasslands[1]	136,412	USFS	Union, Harding, Mora	E
National Wildlife Refuges				
Bitter Lake National Wildlife Refuge	23,189	USFWS	Chaves	E
Grulla National Wildlife Refuge	3,231	USFWS	Roosevelt	E
Las Vegas National Wildlife Refuge	8,238	USFWS	San Miguel	E
Maxwell National Wildlife Refuge	3,102[2]	USFWS	Colfax	E
Natural Landmarks				
Bueyeros Shortgrass Plains	322	Private	Harding	E
Bitter Lake Group[3]	10,090	USFWS	Chaves	E
Maxwell Site[4]	235	USFWS	Colfax	P
Mescalero Escarpment	undetermined	Various	Chaves	P
Mescalero Sands	3,571	BLM, state, private	Chaves	P[5]
Blackwater Draw	not available	not ascertained	Roosevelt	L
Corn Ranch	not known	BLM, private	Chaves	L
Elida Prairie Chicken Booming Grounds	40	Private	Roosevelt	L
Encino Steppe Grassland	undetermined, but large	Private	Guadalupe	L
Sierra Grande Shortgrass Prairie	undetermined, but large	Private	Union	L
State Parks				
Bottomless Lakes State Park	1,611	NM Parks & Recreation Comm.	Chaves	E
Chicosa Lake State Park	407	NM Parks & Recreation Comm.	Harding	E
Clayton Lake State Park	417	NM State Dept. Game & Fish	Union	E
Conchas Lake State Park	1,742	NM Parks & Recreation Comm.	San Miguel	E
Lake Sumner State Park	6,667	NM Parks & Recreation Comm.	De Baca	E
Oasis State Park	197	NM Parks & Recreation Comm.	Roosevelt	E
Ute Lake State Park	1,307	NM Parks & Recreation Comm.	Quay	E
Wilderness Areas				
Sabinosa	16,260	BLM, Private	San Miguel	P
Mescalero Sands	10,575	BLM, NM State	Chaves	P[6]
Salt Creek Wilderness[7]	11,500	USFWS	Chaves	E

868

E = existing.

P = proposed.

L = local significance.

[1]Administered as Cibola National Forest.

[2]400 acres administered by BLM; 500 privately held.

[3]Part of Bitter Lake National Wildlife Refuge.

[4]Part of Maxwell National Wildlife Refuge.

[5]Made up of 352 acres of BLM-managed Mathers Natural Area, 197 acres of state land, 320 acres of state land, and remaining BLM-managed area.

[6]Includes proposed Mescalero Sands Natural Landmark and Mathers Natural Area.

[7]Included in Bitter Lake National Wildlife Refuge.

Impact analysis was performed in three steps: (1) a description of project effects on wilderness, (2) an assessment of the impact to wilderness, and (3) a determination of impact significance. Effects on wilderness ecosystem integrity and quality of experience were described by combining baseline information with project information and area summarized in Table 5. These effects result primarily from general construction activities and recreation.

Hydrologic sub-units were ranked on a scale of 1 to 5 according to the level of potential noise and visual effects resulting from M-X construction activities and current susceptibility to visitations (see Table 6) as measured by proximity to existing paved roads as follows: All hydrologic subunits with wilderness falling within the DDA received a score of 1 because of the general regional pervasiveness of the project-related visual pollution of wilderness activities, overflights, security maneuvers, as well as increased numbers of project-related people. Every potential wilderness will be impacted by these perturbations. A score of 2 was assigned to those hydrologic sub-units where project features are sited within one mile of the wilderness area. A score of 2 was also given a hydrologic sub-units when 100 percent of the wilderness is located within 6 miles of a project feature. A proportionally intermediate score was assigned those hydrologic sub-units with less than 100 percent of the area of the wilderness lying within 6 miles of a project feature. The score in this case ranged from 0 to 2 in proportion to the total percent of wilderness within 6 miles - i.e., 80 percent was scored 1.6. A score of 1 was given where there presently exists a paved road within 3 miles (roughly an hour's hike) of potential legislative wilderness. The three scores when summed could range from 0 to 5 but since hydrologic sub-unit within the DDA automatically is scored "1" (above), all valleys with wilderness are ranked from 1 to 5. The weighting (2 for intensive perception and within a mile, 2 for extensive perceivable visual and audible pollution within 6 miles, and 1 for access within 3 miles), although arbitrary, is reasonable since perception of a project action will reduce wilderness quality and will be an incontrovertable fact - not a potential effect, whereas access does not necessarily mean visitation although they are clearly related as the literature shows (Schmidly, et. al., 1976).

In these regions the encroaching clusters and associated structures would create access to the wilderness for more people. At the same time such access may diminish the solitude opportunity. The impact zone may be expanded. Wilderness recreationists believe the wilderness experience is not achieved until one is at least 3 miles from the nearest development (Merriam & Ammons, 1964). Calculations show that at a moderate averate daily traffic (for construction) level (ADT) of 3000 vehicles with a conservative 15 percent composed of trucks and the remainder passenger vehicles, at 10 meters from the source (road) a db level of 71 is reached, at 10,000 meters (6 miles) 41db - certainly noticeable in a wilderness area which is otherwise pristine. This compares, for

Table 5. Summary of potential impacts to wilderness in the Nevada/ Utah and Texas/New Mexico study areas.

PROJECT PARAMETER	SECONDARY EFFECTS	POTENTIAL IMPACTS	REFERENCES
Area disturbed	Construction		
	Fugitive dust	Degradation in scenic vista quality--temporary loss in wilderness quality.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee et al., 1978
	Erosion	No effects predicted	
	Loss of vegetation	Degradation in aesthetic quality. For those areas from which project construction is visible, there will be a temporary loss in wilderness quality.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee et al., 1978
	Presence of people and machinery	Loss in aesthetic quality and increase in noise levels causing temporary loss in wilderness quality.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee et al., 1978
	Operations		
	Fugitive dust	Degradation in scenic vista quality--temporary loss in wilderness quality.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee et al., 1978
	Erosion	No effects predicted.	
	Revegetation of disturbed areas	Reduction of fugitive dust leading to scenic vista improvement over time as revegetation occurs. Time scale will depend upon natural rate of revegetation and whether enhancement programs are implemented.	
	Transmission lines	For any built within view of areas, there will be degradation in aesthetic quality, loss in wilderness quality.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee et al., 1978
Water use	Lowering of water table with potential loss of surface water in lowland areas which might be connected through connecting drainage systems	Potential for wilderness quality loss and aquatic habitat loss resulting in concentration of people in remaining areas.	Dudley and Larson, 1976.
		Minimal effects expected.	
Vehicle Traffic	Fugitive dust	Degradation in scenic vista quality--temporary loss in wilderness quality.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee et al., 1978
	Noise and visual	Degradation in wilderness quality for those areas through or near which vehicle traffic increases.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee et al., 1978
Security	Radar and microwave emissions	No effects predicted	
	Noise and visual (e.g., helicopter and ground patrol)	Degradation in wilderness quality for those areas through or near which security maneuvers are involved.	Merriam and Ammons, 1964; Krutilla, 1972; Hendee, et al., 1978
		Specific effects will be determined in [illegible] studies.	
People	Sewage	No effects expected.	
	Solid waste	No effects expected.	
During construction, people will be displaced throughout deployment area.	Introduction of exotic species	Data insufficient to predict effects.	
	Recreation	Degradation/loss of wilderness quality. Habitat destruction through vegetation removal and soil disturbance. Changes in animal behavior patterns due to habitat loss and increased noise levels. Increased noise and air pollution levels.	Utah Dept. of Outdoor Recreation, 1979; Altmann, 1956; McNamara, Berwick, & Willyer, 1980; The Geological Society of America, 1977; Wilshire & Nakata, 1976; Wilshire et al., 1978; Bury et al., 1977 Vollmer et al., 1976; BLM (1975); Bondello 1980; Busak & Bury, 1974; San Diego State Univ. & Hubbs/Sea World Research Instit. 1978.
During operations, people and effects will be concentrated in the vicinity of operating bases.	Unauthorized ORV use	Data insufficient to quantify effects	
	Camping, hiking, etc.	Degradation/loss in wilderness quality due to trampling and crushing of vegetation. Trail erosion from increased use of area.	Irland, 1979; Setterqren, 1977; McQuaid-Cook, 1978; Frissell & Duncan, 1965; Merriam & Smith, 1974; Varbury, 1974.
		Alteration of animal populations.	McQuivey, 1978
		Increased level of contact with cultural amenities.	Hendee et al., 1978.
		Increased use and misuse of resources.	Miller, 1980; Long, 1980; DeGraff, 1980.
		Increased litter and sanitation problems, attraction of nuisance organisms.	Curran, 1980; Parsons, 1980.
	Hunting, fishing, poaching	Wilderness quality degradation/loss since there exists the potential for decrease in populations particularly in isolated areas with the anticipated increase in hunting and fishing pressures.	

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Table 6. Construction-related effect level grading on wilderness quality (noise and visual) (page 1 of 3).

HYDROLOGIC SUBUNIT NUMBER	WILDERNESS NAME	PROJECT ELEMENT WITHIN 1 MI	PERCENT WILDERNESS WITHIN 6 MI	EXISTING PAVED ROAD WITHIN 3 MI	WILDERNESS GRADE	HYDROLOGIC SUBUNIT GRADE	NORMALIZED GRADE[1] (1-5)	TOTAL WILDERNESS ACRES WITHIN SUBUNIT	ABUNDANCE GRADE[2]	TOTAL GRADE 1-5 ($\bar{x}$)
Snake 4 *†	Fish Springs	Yes	100	No	4.0					
	Conger Mountain	Yes	100	No	4.0					
	Deep Creek Mountains	Yes	65	No	3.3					
	King Top	Yes	100	Yes	5.0					
	Wah Wah Mountains	Yes	100	Yes	5.0					
	Granite Spring	No	60	No	1.2					
						22.5	4.9(5)	104,000	3	5(4.0)
Pine 5 *†	Wah Wah Mountains	Yes	100	Yes	5.0					
						5.0	1.1(1)	12,000	1	2(1.0)
White 6 *†	King Top	Yes	75	Yes	4.5					
	Fish Springs	Yes	90	Yes	4.8					
	Notch Peak	Yes	85	Yes	4.7					
	Howell Peak	No	55	No	1.1					
	Conger Mountain	Yes	90	No	3.8					
	Swasey Mountain	Yes	65	No	3.3					
						22.2	4.8(5)	122,000	3	5(4.0)
Fish Creek 7 *†	Fish Springs	Yes	70	No	3.4					
	Swasey Mountain	Yes	95	No	3.9					
						7.3	1.6(2)	48,000	1	3(1.5)
Dugway 8 *†	None	—	—	—	—	—	0.2(1)			1(0.5)
Government Creek 9 *†	None	—	—	—	—	—	0.2(1)			1(0.5)
Sevier Desert 46 *†	Swasey Mountain	Yes	100	No	4.0					
	Little Sahara	—	—	—	—					
						4.0	0.8(1)	34,000	1	2(1.0)
Sevier Desert/Dry Lake 46A *†	Howell Peak	No	45	No	0.9					
	Notch Peak	Yes	100	Yes	5.0					
						5.9	1.3(1)	52,000	1	2(2.0)
Milford 50	None	—	—	—	—	—	0.2(1)			1(0.5)
Beryl Enterprise 53	Pine Valley Mountain	No	0	No	0.0	—	0.2(1)			1(0.5)
Pine (NV) 53	Roberts	No	50	No	1.0	1.0	0.2(1)			
Wah Wah 54 *†	Wah Wah Mountains	Yes	100	Yes	5.0					
	King Top	Yes	100	No	2.0					
						10.0	2.2(2)	26,000	1	3(1.5)
Upper Reese River 56	Arc Dome	No	0	No	0.0	—	0.2(1)			1(0.5)
Big Smoky South 137A*	Arc Dome	No	0	No	0.0	—	0.2(1)	10,000	1	1(1.0)
Big Smoky North 137B	Arc Dome	No	0	Yes	1.0					1(0.5)
Kobeh 139 *	Roberts Mountains	No	50	No	1.0					
						1.0	0.2(1)			
						1.0	0.2(1)	3,000	1	2(1.0)
Monitor 140 *	None	—	—	—	—	—	0.2(1)			1(0.5)
Ralston 141 *	None	—	—	—	—	—	0.2(1)			
Alkali Spring 142 *	None	—	—	—	—	—	0.2(1)			1(0.5)
Cactus Flat 148	Kawich	Yes	30	No	2.6	2.6	.6(1)	11,000	1	2(1.0)
Stone Cabin 149	Rawhide Mountain	Yes	85	Yes	4.7					
	Kawich	Yes	75	No	3.5					
						8.2	1.8(2)	31,000	1	3(1.5)

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Table 6. Construction-related effect level grading on wilderness quality (noise and visual) (page 2 of 3).

HYDROLOGIC SUBUNIT NUMBER	WILDERNESS NAME	PROJECT ELEMENT WITHIN 1 MI	PERCENT WILDERNESS WITHIN 6 MI	EXISTING PAVED ROAD WITHIN 3 MI	WILDERNESS GRADE	HYDROLOGIC SUBUNIT GRADE	NORMALIZED GRADE[1] (1-5)	TOTAL WILDERNESS ACRES WITHIN SUBUNIT	ABUNDANCE GRADE[2]	TOTAL GRADE 1-5(5)
Little Fish Lake 150	Antelope	No	20	No	0.4	0.4	0.1(1)	16,000	1	2(1.0)
						2.0	0.4(1)			
Antelope 151 *	Antelope	No	100	No	2.0	2.0	0.4(1)	2,000	1	2(1.0)
Newark 154 *	None	—	—	—	—	—	0.2(1)		1	1(0.5)
Little Smoky *†	Antelope	Yes	100	No	4.0					
	Palisade Mesa	Yes	100	Yes	5.0					
	The Wall	Yes	100	No	4.0					
	Park Range	Yes	45	No	2.9					
						15.9	3.5(4)	61,000	2	4(3.0)
Hot Creek 156 *†	Morey	Yes	95	No	3.9					
	Rawhide Mountain	Yes	100	Yes	5.0					
	Palisade Mesa	Yes	100	Yes	5.0					
	South Reveille	Yes	85	Yes	4.7					
	Kawich	Yes	100	No	4.0					
	Antelope	No	15	No	0.3					
						22.9	5(5)	147,000	4	5(4.5)
Penoyer 170 *†	Quinn Range	No	70	No	1.4	1.4	0.3(1)	20,000	1	2(1.0)
Coal 171 *†	Weepah Spring	Yes	100	No	4.0	4.0	0.8(1)	24,000	1	2(1.0)
Garden 172 *†	Grant Range	Yes	85	No	3.7					
	Quinn Range	No	40	No	0.8					
						4.5	0.9(1)	91,000	1	2(1.0)
Railroad 173A *†	South Reveille	Yes	90	Yes	4.8					
	Kawich	Yes	100	No	4.0					
						8.8	1.9(2)	80,000	1	3(1.5)
Railroad 173B *†	Blue Eagle	Yes	45	Yes	3.9					
	The Wall	Yes	85	Yes	4.7					
	Palisade Mesa	Yes	95	Yes	4.9					
	Riordan's Well	No	70	No	1.4					
	Quinn Range	Yes	100	No	4.0					
	Grant Range	No	45	No	0.9					
						19.8	4.3(4)	242,000	4	5(4.0)
Jakes 174 *	None	—	—	—	—	—	0.2(1)			1(0.5)
Long 175 *	None	—	—	—	—	—	0.2(1)			1(0.5)
Butte 178 *	Goshute Canyon	No	50	No	1.0	1.0	0.2(1)	9,000	1	2(1.0)
Steptoe 179 *	Mt. Grafton	No	100	No	2.0					
	Goshute Canyon	No	30	Yes	1.6					
						3.6	0.8(1)	29,000	1	2(1.0)
Cave 180 *†	South Egan Range	No	10	No	0.2					
	Mt. Grafton	No	65	No	1.3					
	Far South Egans	Yes	100	No	4.0					
						5.5	1.2(1)	75,000	1	2(1.0)
Dry Lake 181 *†	None	—	—	—	—	—	0.2(1)			1(0.5)
Delamar 182 *†	Delamar Mountains	Yes	100	No	4.0					
	South Pahroc/Hiko	No	100	No	2.0					
						6.0	1.3(1)	23,000	1	2(1.0)
Lake 183 *†	Fortification Range	Yes	100	No	4.0					
	Table Mountain	No	85	No	1.7					
	Mt. Grafton	Yes	100	Yes	5.0					
						10.70	2.3(2)	72,000	2	4(2.0)

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Table 6. Construction-related effect level grading on wilderness quality (noise and visual) (page 3 of 3).

HYDROLOGIC SUBUNIT NUMBER	WILDERNESS NAME	PROJECT ELEMENT WITHIN 1 MI	PERCENT WILDERNESS WITHIN 6 MI	EXISTING PAVED ROAD WITHIN 3 MI	WILDERNESS GRADE	HYDROLOGIC SUBUNIT GRADE	NORMALIZED GRADE[1] (1-5)	TOTAL WILDERNESS ACRES WITHIN SUBUNIT	ABUNDANCE GRADE[2]	TOTAL GRADE 1-5($\bar{x}$)
Spring 184 *†	Fortification Range	No	100	No	2.0	2.0	0.4(1)	8,000	1	2(1.0)
Hamlin 196 *†	White Rock Range	No	20	No	0.4					
	Table Mountain	No	40	No	0.8					
						1.2	0.3(1)	9,000	1	2(1.0)
Spring 201	Table Mountain	No	100	No	2.0					
	White Rock Range	No	10	No	0.2					
	Parsnip Peak	No	25	No	0.5					
						2.7	0.6(1)			1(0.5)
Patterson 202 *†	Parsnip Peak	Yes	25	Yes	3.5	3.5	0.7(1)	40,000	1	2(1.0)
Meadow Valley Wash 205	Meadow Valley Range	Yes	10	Yes	3.2					
	Mormon Mountains									
	Pennsylvania Canyon		NOT NEAR DTN (NEAR OB)							
	Grapevine Spring									
						3.5	0.7(1)			1(0.5)
Kane Springs 206	Meadow Valley Range	No	0	No	0.0					
	Delamar Mountains	Yes	50	Yes	4.0					
						4.0	0.8(1)			1(0.5)
White River 207 *†	South Egan Range	No	5	Yes	1.1					
	Far South Egan Range	No	95	Yes	2.9					
	Riordan's Well	Yes	95	No	3.9					
	Grant Range	No	60	No	1.2					
						9.1	1.9(2)	78,000	2	4(2.0)
Pahroc 208 *†	Weepah Spring	Yes	25	No	2.5	2.5	0.5(1)	45,000	1	2(1.0)
Pahranagat 209 *†	Desert National Wildlife Range	Yes	10	Yes	3.2					
	East Pahranagat									
	Madsgar Pass	No	70	Yes	3.4					
	Lower Pahranagat Lake	No	100	Yes	3.0					
	South Pahroc s/Hiko	No	70	Yes	2.4					
	Delamar Mountains	Yes	60	Yes	3.2					
						15.2	3.3(3)	15,000	3	4(3.0)
Coyote Springs 210	Desert National Wildlife Range	Yes	35	Yes	3.7					
	Delamar Mountains	Yes	50	Yes	4.0					
	Fish and Wildlife #1	No	85	Yes	2.7					
	Fish and Wildlife #2	No	10	Yes	3.2					
	Fish and Wildlife #3	No	0	Yes	1.0					
	Arrow Canyon Range	No	10	Yes	1.2					
						15.8	3.4(3)	433,000	5	5(1.0)
Muddy Springs 219	Arrow Canyon Range	No	0	Yes	1.0	—	0.2(1)			1(0.5)

[1]Because of pervasive regional projects effects, all potential wilderness areas in the DDA are given a rank of at least "1" on the 1-5 scale (if they score less than 1). See text.

[2]Abundance rank is a score combining grades of 1 to 5 for acreage and number of areas.

●( ) = rounded to nearest whole number.

*DDA hydrologic subunits.

†Split basing hydrologic units.

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example to the threshold of hearing in humans (zero db), leaves in a breeze (20 db), a freeway (80 db) and the threshold of pain (100-120 db) (CEQ Annual Report, 1979). Thus, while siting clusters and road networks adjacent to prospective wilderness on the one hand would increase access to, and hence opportunities for, enjoyment of our wilderness heritage, on the other, it would reduce and hence compromise the desirable unimpaired primitive/natural qualities associated with wildlands. Short-term effects of project implementation on wilderness would include those associated with the burst of construction activities - changes in noise and air quality levels and dispersed recreational use by the increased human population associated with the project. Once construction is completed, the presence of fenced protective structures, DTN, and cluster road networks would permanently alter scenic vistas from nearby potential wilderness areas and might also interfere with animal migration patterns between montane wilderness and lower elevation winter ranges (e.g., mule deer, elk and bighorn sheep; McNamara, et. al., 1980). These constitute the potential long-term effects of an irretrievable nature.

Population-related effects on the ecological integrity and quality of the wilderness experience will be proportional to user density and will be primarily a function of population centers associated with construction camps and OBs. The effect of the OB's are expected to be of much more importance than the camps because they are more permanent. Camp personnel will be transported in and out on a rotational basis and will be relatively contained during the intense work period.

An estimate of the potential "short-term" population-related effects was derived by taking the ratio of wilderness and acreage per hydrologic sub-unit to the anticipated peak year M-X population increase according to the Construction Resource Requirements for the DDA. A subunit with less than 10 wilderness acres per person was determined to have a significant impact potential on wilderness ecology/quality. Critical areas include Pine, Sevier Desert, Wah Wah, Big Smoky, Tonopah Flat, Kobeh, Stone Cabin, Antelope, Penoyer, Coal, Butte, Spring and Hamlin valleys. The analysis for "short-term" people-related effects is only a first approximation and presumes use is primarily in wilderness adjacent to the hydrologic subunit under consideration. The analysis does not take into account site attractiveness.

In order to arrive at a means of assessing the potential effect a M-X induced population increases on the wilderness resource, an indirect effect index for OB impact analysis was developed using linear distance from the population center and the attractiveness of a particular site. The effect index is not a prediction of the actual level of impact on the wilderness resources, but rather it is an index to which a measured impact should be correlated. Such measured impacts would include campsite overcrowding, vegetation loss and erosion by trampling, poaching, etc. The population of each operating base would produce a human-related, indirect

use effect on each wilderness which decays in a Gaussian exponential fashion similar to a gravity model, as the distance from the base increases. The model produces an index of effects which incorporates a measure of appeal for each area and which can be used for ordinal ranking of the different potential base sites and, when the areas under the normal curves for two bases of an alternative are added, for ranking the relative effects of each alternative.

The impacts are assumed to be normally distributed from the base. The standard deviation of the impact is arbitrarily defined at 35 miles. That implies that 68 percent of the effects of the OB site will be within a 35-mile radius, and 95 percent of the effects will be within 80 miles of the basing site.

The index of effect is given by the following equation:

$$E_{ik} = \sum_{j=1}^{2} \exp\left[-\frac{1}{2}\left(\tilde{x}_{ij} / \sigma A_i\right)^2\right] P_j$$

Where:

E_{ik} = Index of Effect of Alternative K on resource i

$\tilde{x}_{ij}$ = Distance of i^{th} resource from j^{th} base

σ = Primary standard deviation (=35 miles)

A_i = Appeal Index of Resource i.

P_j = Long-Term Population of base j.

The appeal index is defined as an integer from 1 to 3. This index is used as a multiplier to extend the range of impact. If the resource is such that a person would drive 200 miles to the site, then the appeal index equals 2. If the resource is particularly attractive, and people would drive 300 or more miles to the site, then the resource index equals 3. Due to the paucity of visitor-use data, interviews with naturalists whose professional careers deal with the area were conducted (Tausch, 1980; Schuldt, 1980; Shochat, 1980; Onvif, 1980; Biddulph, 1980). Their ranking generally agreed and generated the somewhat arbitrary appeal index. The appeal index easily allows incorporation of the attractiveness of a particular site into the model.

The necessary input data is provided by a table of measured air distances from each proposed OB site to each of the 55 wilderness areas within the DDA. The model then computes the effect index for all 55 sites. The combined average effect indexes of basing alternative on wilderness areas is given in Table 7. These data are used to compute mean

Table 7. Combined average effect of basing alternatives on wilderness area.

NO	LOCATION NAME	APPEAL	AVERAGE EFFECT INDEX BY ALTERNATIVE 0	1	2	3	4	5	6
1	FISH SPR	1.0	303.8	3.8	4346.3	867.2	3.1	1262.3	400.3
2	CONGER MT	2.0	8471.6	5075.7	9784.3	15919.4	6398.3	20381.4	10860.3
3	DEEP CREEK	2.0	3420.6	1250.6	6882.1	10457.1	1590.1	12313.1	4446.1
4	KING TOP	1.0	5104.0	584.5	3303.9	2944.6	771.5	8897.4	6724.4
5	WAH WAH MT	1.0	7703.6	2170.8	1379.1	3428.9	2864.7	10712.3	10148.3
6	NOTCH PK	1.0	3802.7	183.7	5767.2	1228.2	242.5	5995.7	5010.0
7	HOWELL PK	1.0	2208.8	76.7	6431.3	1224.5	101.3	4033.3	2910.1
8	SWASEY MT	1.0	1484.8	29.5	7587.3	901.1	39.0	2818.4	1956.2
9	LTL SAHARA	1.0	259.3	0.8	10813.1	9.5	1.1	350.1	341.7
10	PINE VALLE	3.0	21027.7	22198.3	16036.5	21677.5	24674.8	18784.4	21781.7
11	ARC DOME	2.0	464.1	303.9	398.4	2271.8	453.1	2216.4	397.7
12	ROBERTS MT	1.0	0.0	0.0	0.0	565.8	0.0	565.8	0.0
13	RAWHIDE	1.0	14.5	13.0	14.5	86.5	11.8	85.7	11.1
14	RAVICH	2.0	4343.2	3416.9	4285.9	4321.4	4792.4	3167.2	3638.1
15	ANTELOPE	1.0	0.3	0.5	0.3	653.3	0.5	653.3	0.3
16	PALISADE M	1.0	36.9	42.8	36.7	397.4	36.0	389.7	28.2
17	THE WALL	1.0	36.9	42.8	36.7	397.4	36.0	389.7	28.2
18	PARK RANGE	1.0	898.8	1.1	0.8	986.2	1.1	2168.8	1183.7
19	MOREY	2.0	2421.4	2962.0	2070.0	7532.6	2839.6	6817.7	2124.6
20	S REVEILLE	1.0	433.5	439.5	433.4	32.4	339.0	24.4	331.1
21	QUINN	2.0	7471.8	9721.9	6528.5	10539.6	9365.6	7565.7	6391.8
22	WEEPAHSPRG	1.0	1468.8	2561.0	1419.9	1995.1	2591.0	553.0	1148.9
23	GRANT RG	1.0	200.9	303.0	1072.5	1342.6	292.5	1207.7	157.7
24	BLUE EAGLE	1.0	52.4	124.5	40.7	3575.9	141.9	3480.7	46.6
25	RIORDANS M	1.0	52.4	124.5	40.7	3575.9	141.9	3480.7	46.6
26	RUBY MTNS	2.0	269.1	116.1	620.9	6062.7	142.1	6264.0	343.5
27	COSMOECYN	1.0	1.5	0.1	15.4	4758.3	0.1	4760.2	2.0
28	SO EGAN	2.0	6910.2	7567.2	4731.1	18613.7	8406.3	17735.5	7528.0
29	DELAMARMTS	1.0	12873.1	13937.5	12866.2	1417.3	11241.0	12.1	9835.8
30	FORTIRANGE	1.0	995.7	1409.7	79.0	6176.4	1840.6	5627.3	1291.5
31	WHITE ROCK	2.0	14125.9	15884.3	8068.7	22974.2	18147.2	20628.6	13801.5
32	PARSNIP PK	2.0	13996.5	17296.9	9108.6	20644.1	19018.5	16268.0	14642.4
33	FAR S EGAN	1.0	237.5	663.7	82.6	4945.3	832.0	4382.2	268.9
34	DNWR	1.0	13908.5	15972.2	13908.5	84.3	12234.5	0.2	12150.4
35	ARROW CYN	1.0	13805.3	16180.9	13804.9	496.4	12567.6	0.8	12071.9
36	ZION NP	3.0	18343.0	20274.8	13762.7	18945.4	21889.3	16433.0	19576.9
37	CEDAR BRKS	3.0	19046.8	19254.6	14253.2	20017.2	21193.4	19712.4	20888.5
38	ASHDOWN	3.0	19190.9	19485.0	13816.0	20406.0	21448.4	19986.9	21029.4
39	RED CYN NO	2.0	10483.5	8550.1	4927.2	17524.4	10614.2	20052.0	13141.8
40	BRYCE CYN	3.0	13124.7	16943.7	11310.5	18373.0	19098.4	16472.5	17197.9
41	TABLE MTN	1.0	1309.5	3024.9	110.6	5953.0	2953.2	3683.0	1685.2
42	JARBIDGE	2.0	9.6	2.5	81.8	569.0	3.2	578.4	12.7
43	LONE PK	2.0	786.6	126.4	2553.5	272.8	166.2	1142.4	1035.8
44	MT CRAFTON	2.0	8733.1	9572.2	5963.3	20022.2	10786.7	18899.9	9664.5
45	FARSOEGANS	2.0	8020.6	9455.9	5643.6	18030.9	10232.7	16125.5	8527.3
46	SOPAHROCS	1.0	5765.9	6580.3	5755.3	1113.5	5484.8	38.4	4409.7
47	EASTPAHRAN	1.0	8583.5	8880.7	8582.4	397.3	6948.7	5.0	6556.4
48	MACSCARPS	1.0	10239.7	10585.7	10237.3	463.3	8278.8	6.6	7822.1
49	LOPAHRANLK	1.0	10239.7	10585.7	10237.3	463.3	8278.8	6.6	7822.1
50	FW123	1.0	15960.7	16113.8	15960.5	205.0	12395.0	0.4	12190.4
51	GRPVINESPR	1.0	5877.4	10964.7	5755.3	7863.0	11272.9	1146.6	4556.6
52	MEADOW VAL	2.0	17091.0	22395.5	15296.1	10742.5	21188.7	9734.3	14180.5
53	MORMON MTS	2.0	16896.0	22350.2	14806.5	11262.1	21401.4	4055.6	14194.8
54	PENN CYN	1.0	13564.6	14103.9	13561.8	719.4	11076.2	4.8	10361.6
55	GRAN SPR	2.0	5912.1	3211.6	6832.5	13795.7	4016.6	19346.1	7567.0

effect index and the standard deviation for each alternative. These data are used to rank the alternatives. This ranking is given in Table 8. With respect to the combined mean effect index for population-related impacts, Alternative 2 (Coyote Spring/Delta) would appear to have the least overall effect on the wilderness resource. A more detailed discussion of this methodology may be found in ETR 30.

Full deployment in Nevada and Utah will mean the construction or upgrading of about ten thousand miles of road and the importation of about 85,000 workers, their families, associated merchants, and others (University of Utah, Bureau of Economic and Business Research, 1980). The initial construction activities and subsequent increased access for an increased population would impinge on the wilderness resource. Figure 4 illustrates wilderness and project intersections.

The data in Table 6 suggests a high potential for wilderness quality degradation since more than 60 percent of the areas are within (at some point) a mile of project action (excluding OBs) during construction with a consequent high probability of sight and sound pollution and of interruption of wilderness fauna (e.g. antelope are known to flee at 2.5 miles (Kitchen, 1974)). Audible evidence of project action will affect roughly 2/3 of the total potential wilderness in the Great Basin study area. It is assumed that M-X construction in those hydrologic sub-units with several wilderness areas will result in a greater potential for impact on the overall wilderness quality of the area than in those with only one wilderness. Snake, White, Hot Creek, Garden, Cave, Lake, White River and Railroad hydrologic subunits are particularly critical since all have more than 55,000 acres of potential wilderness within 6 miles of a project element. Additional sensitive valleys include Little Smoky, Pahranagat, and Coyote Springs. However, because of the large dispersed nature of the M-X project, noise and visua. effects of construction activities are expected to occur over an area considerably larger than the immediate valleys disturbed during construction of facilities.

Based on the demographic features of construction and military personnel, their associates and families, research at a SAC airbase at Mountain Home, Idaho indicated about 7 percent of the residents used wilderness (Haagen, 1980). Thus an estimate of 5 - 10 percent of the 85,000 in-migrants seems a reasonable projection of potential wilderness users (4250 - 8500 people). With the historically pristine Great Basin wildlands hosting increased levels of recreationists, there exists the potential for degradation of the ecological integrity and quality of wilderness experience that may not be entirely avoidable by increased management attention.

For example, according to a 1973 report about 2/3 of the visitors to the High Primitive Area located about 50 miles east of Salt Lake City expressed dissatisfaction at the crowding near a lakeside camp,

Table 8. Ranking of alternatives by least effect the mean combined effect index, standard deviation and standard error, for 55 wilderness areas.

RANK BY MEAN	ALT. NO.	OB BASE PAIRS	MEAN COMBINED EFFECT INDEX[1]	STANDARD DEVIATION ABOUT MEAN	STANDARD ERROR ABOUT MEAN	SUBJECTIVE RANKING[2]
1	2	Coyote Delta	6,158	5,495	741	1
2	6	Milford Coyote	6,477	6,502	877	2
3	5	Milford Ely	6,484	7,370	994	3
4	0	Coyote Milford	6,625	6,634	894	4
5	4	Beryl Coyote	6,762	7,597	1,024	5
6	3	Beryl Ely	6,768	7,609	1,026	6
7	1	Coyote Beryl	6,835	7,575	1,021	7

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[1]Computed from columns of table.

[2]Using mean, standard deviation and standard error.

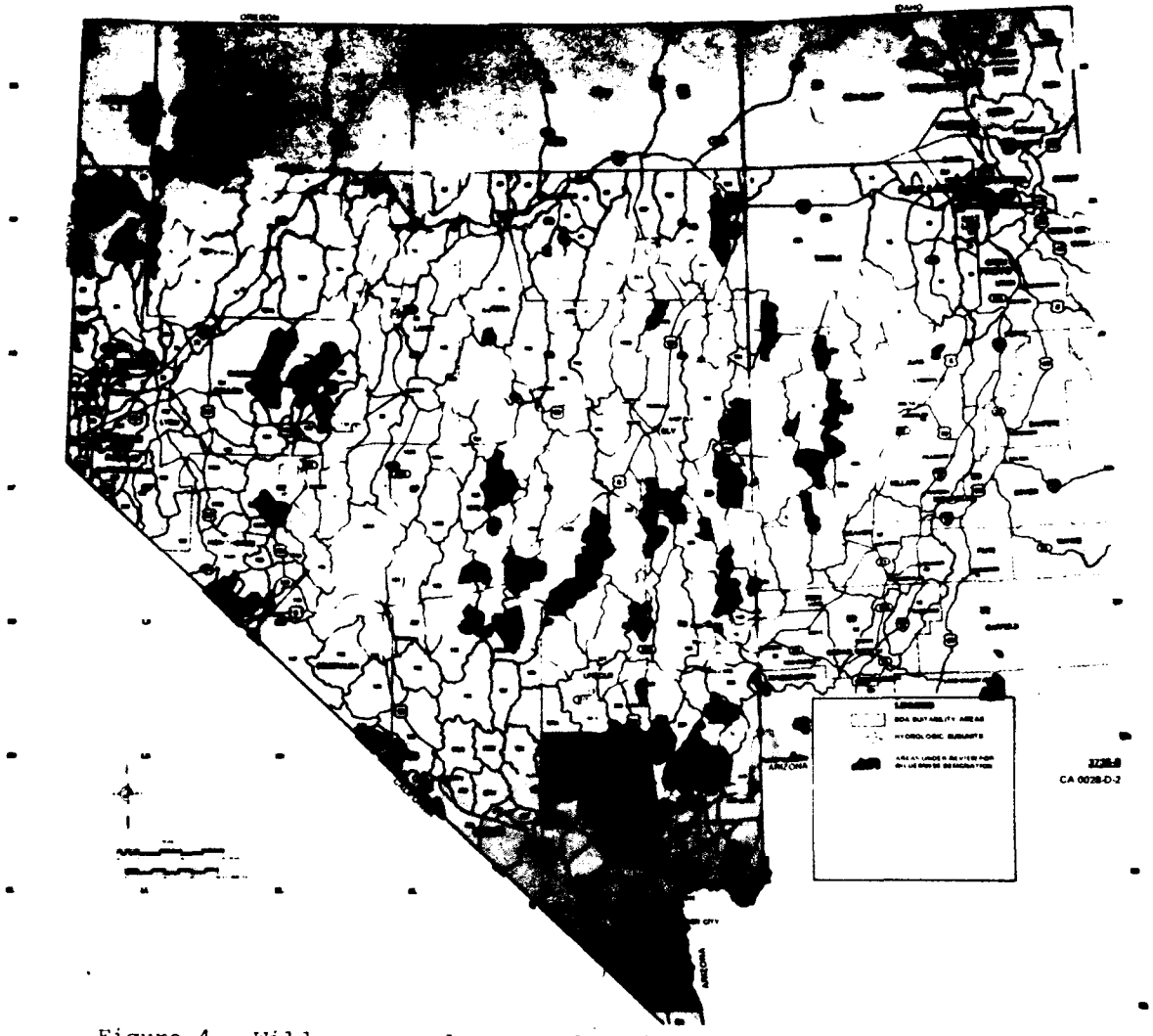

Figure 4. Wilderness and proposed action conceptual project layout.

and more than 50 percent agreed their visit was most enjoyable when they did not encounter other people. In fact, if 3 to 4 parties were encountered, the experience was clearly unpleasant. This level of encounter is, however, common (Stankey 1973). In 1969, this 237,000 acre area experienced over 100,000 visitor-days use. Assuming trips of 3 days duration, about 34,000 people visited the High Uintas that year. This indicates a use level of about 7 acres per person per year, although it should be noted that this is an average since use is in patches correlated with resources such as water. Between 1969 and 1975 the area received a 32 percent increase in visitation (Hendee, et al., 1978). Counties in the vicinity of the area (Cache, Davis, Morgan, Salt Lake, Utah, Wasatch & Weber) that would be potential contributors to increased use, experienced a population increase of 13 percent during the same time period (Utah Population Work Committee, 1980).

Assuming about 24 percent of the BLM recommended and designated wilderness study areas (approximately 3 million acres as of April 1, 1980) within the DDA survives as "classified" as with the RARE II review (USFS, 1979), at peak construction with current population models, use of Great Basin wilderness in the DDA would be approximately 4.16 acres per person (4.4 without M-X) further indicating a relatively high potential for crowding at levels that degrades wilderness quality in the eyes of many users. Furthermore, the dispersal potential of the DTN will, as discussed elsewhere, render the areas more accessible.

DDA IMPACTS

M-X deployment could affect wilderness through construction activities as well as recreation activites of construction and OB personnel. Impacts on wilderness can be defined by the extent to which particular wilderness attributes - ecosystem integrity and quality of experience - are degraded below acceptable levels. Acceptable levels are determined by the particular managing agency of a given wilderness area in accordance with the Wilderness Act of 1964 and the Federal Land Policy and Management Act of 1964. (FLPMA). The primary sources of project-related impacts to the wilderness resource include (1) valley floor scarification by cluster and road networks with the resultant alteration of scenic landscapes visible from montane vista points, (2) enhanced noise levels and changes in air quality during construction activities, (3) increased access to formerly remote areas, and (4) increased numbers of people. Potential impacts of project implementation on wilderness in relation to the four issue areas - competition for resources, constraints on future development opportunities, stress on growing communities, and preservation of biophysical and cultural resources - are summarized in Tables 9 and 10.

Implementation of other projects such as the Anaconda Moly Mine near Tonopah, White Pine Power Project (WPPP), Pine Grove Moly project in Pine Valley, Allen Warner project in Dry Lake Valley, Alunite Mine

Table 9. Summary of effects and related consequences on the attribute "wilderness ecology" for potentially significant project disturbances. (page 1 of 2)

	WILDERNESS ECOLOGY			
		COMPACTION	FIRE	
	DECREASED VEGETATION	EROSION	OVER-PROTECTION	SELECTIVE INCREASE
Constraints on Future Development	Will decrease recharge in watershed which is the source of aquifer recharge as well as stream and spring sources; will result in decreased opportunities for livestock watering and mining inside and outside the wilderness. Berwick, 1976 Hendee et al, 1978	Will accelerate decrease in percolation; with switchbacking, loss of litter and vegetative cover, increased compaction sheet and gully erosion. McQuaid-Cook, 1978 Liddle, 1975	Loss of entire vegetative communities which are of scenic value and which are of critical importance for wildlife species. (e.g., aspen and mountain bunch grass meadows are important for deer and grouse) Gullion, 1973 Stoddart et al., 1955	Increase changes and loss of vegetation due to man-caused fires around heavy use areas. Hendee et al., 1978 Daubenmire, 1968
Competition for Resources	Minor and local effects will only slightly decrease forage base for stock and wildlife primarily in riparian areas.	N/A	Decrease in grazing and hunting increase in poor quality timber which cannot be extracted resulting eventually in high fuel loading and the potential for catastrophic fire with devastating effects. (e.g., in areas with stands of Douglas Fir and Lodgepole Pine—Snake, Schell Creek, and Egan Ranges). Bailey, 1978 Stoddart et al., 1955	Precludes use (camping, grazing, etc) for several years after a fire.
Stress on Growing Economy	Small relief of other M-X included economic stresses due to increased sales of hay, packstoves, etc. Robinson, 1979 Additionally, water loss may stress irrigation, agriculture and livestock industries.	N/A	Decrease in value of summer grazing leases due to decrease in grass and shrublands; loss of recreational hunting. Bailey, 1978 Stoddard et al., 1955	Fire suppression activities stimulate local economies (use of facilities such as air fields, purchase of goods and services by firefighters, and employment of locals on firelines. Trollope, 1978
Preservation of Biophysical and Cultural Resources	Loss of important riparian vegetation and campsites. Frissell & Duncan, 1965 Wager, 1964 Merriam & Smith, 1974 Bell & Bliss, 1973 Liddle, 1975 Schmidley et al., 1976 Settergren, 1977 Schridly & Ditton, 1979	Loss of riparian and aquatic flora and fauna outside and inside the wilderness. Hendee et al., 1978	Loss of native xeric successional communities of value of grazing, wildlife, and recreation. Daubenmire, 1968 Daubenmire, 1970 Stoddard et al., 1955	Loss of riparian and aquatic flora and fauna outside and inside the wilderness. Hendee et al., 1978

Table 9. Summary of effects and related consequences on the attribute "wilderness ecology" for potentially significant project disturbances. (page 2 of 2)

	WILDERNESS ECOLOGY		
	FAUNA	INCREASED USE	
	INCREASED WINTER RANGE EXPLOITATION	WOOD	FORAGE
Constraints on Future Development	Loss of harvestable game and furbearers during hunting and winter trapping seasons. Particular impacts may be felt by such vertical migrants as mule deer, elk, mountain sheep, and bobcat. Dasmann, 1964 Leopold, 1966 Gallizioli, 1979 Skovlin et al., 1968 Mackie, 1970	Increased exploitation of firewood results in local denudation around camps for about 20-50 years after release from impact and management control begins; also results in increased erosion, decreased water recharge, and decreased fauna. Settergren, 1977 Hendee et al., 1978	Increased pack animal may result in decreased vegetation as well as loss of palatable forage for wild grazers and livestock (cattle and sheep) Weaver and Dale, 1978 Liddle, 1975
Competition for Resources	Decreased huntable and watchable wildlife in wilderness resulting in altered ecology and compressed succession time. Geist, 1975 Leopold, 1966 Gallizioli, 1979 Taber & Dasmann, 1956	N/A	Competition of pack animals with livestock.
Stress on Growing Economy	Increased population with increased access results in increased furtrapping for valuable higher altitude furbearers such as marten and bobcat, stimulation of local economies. Smith & Jordan, 1976	Small relief of other M-X included economic stresses due to increased sales of hay, packstoves, etc. Robinson, 1979 Additionally, water loss may stress irrigation, agriculture and livstock industries.	Decreased value of summer grazing leases.
Preservation of Bio-physical and Cultural Resources	Loss of native fauna (marten and bobcat) and primary browsing herbivores. Hendee et al., 1978 Gallizioli, 1979	Loss of important riparian vegetation and campsites. Frissell & Duncan, 1965 Wager, 1964 Merriam & Smith, 1974 Bell & Bliss, 1973 Liddle, 1975 Schmidly et al., 1976 Settergren, 1977 Schmidly & Ditton, 1979	Loss of important riparian vegetation and campsites. Friessell & Duncan, 1965 Wager, 1964 Merriam & Smith, 1974 Bell & Bliss, 1973 Liddle, 1975 Schmidly et al., 1976 Settergren, 1977 Schmidly & Ditton, 1979

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Table 10. Summary of effects and related consequences on the attribute "wilderness quality" for potentially significant project-related disturbances. (page 1 of 2)

	WILDERNESS QUALITY	
	POPULATION RELATED	
	INCREASED ENCOUNTERS	INCREASED LITTER AND VANDALISM
Constraints on Future Development	Decrease in quality of wilderness experience with increased densities of people will result in wilderness zoning to reduce or spread use within a finite limit and will place an absolute ceiling on the economic benefits of this type of recreation as opposed to the almost infinitely compressible high density recreation and associated profits (e.g., the floor of Yosemite Valley) foreclosure of intensive developed recreation. Heberlein, 1977 Stankey et al., 1976 Behan, 1976 Hendee et al., 1978	Would constrain use of future wilderness in so far as private land owners with access would impose restrictions on public use of access points. Increased agency costs associated with dispersion and development of less than first choice campsites would result in more dispersed use of wilderness and therefore decreased wilderness. Schuldt, 1980
Competition for Resources	M-X-induced increased population will add to the competition for wilderness experience. The use of other USFS and BLM lands will result in increased competition for agency management, and funding for wilderness.	Management and enforcement costs associated with litter and vandalism detract from other resource developments, e.g., intensive recreation, information/education programs, etc. DeGraffe, 1980
Stress on Growing Economy	The several thousand new wilderness users will stimulate local recreation supply business, and enhance tourism-based businesses, e.g., gas, motel, restaurants, gambling, etc.	A small stimulus to local economies to dispose of waste, repair and restore vandalized objects, trails, etc.
Preservation of Biophysical and Cultural Resources	Influx of non-residents will change endemic cultures and economies in proportion to the density of new wilderness users and how alien they are—e.g., extrapolation from Zion National Park currently indicates about 25 percent foreign users with attendant cultural adjustments. Biophysical correlates of increased public health problems, such as giardiasis, introduction of exotic flora and fauna as well as decrease in solitude aspects of wilderness. Christensen et al., 1979 Anonymous, 1979 Daily & Redman, 1975 Stankey et al., 1976 Stankey, 1973 Badger, 1975 Hendee et al., 1978 Iverson, 1978 Denny, 1974 Coman & Brunner, 1972	Degradation of wilderness quality—naturalness aspect. Stankey, 1973 Lee, 1975 Hendee et al., 1978

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Table 10. Summary of effects and related consequences on the attribute "wilderness quality" for potentially significant project-related disturbances. (page 2 of 2)

	WILDERNESS QUALITY	
	CONSTRUCTION AND OPERATIONS	
	INCREASED NOISE	VISUAL POLLUTION
Constraints on Future Development	Noise at decibel levels above natural ambient (10-40 decibels) can be heard up to 10 miles from construction machinery and aircraft. Such changes in noise levels will decrease the quality of about 20 percent of the currently proposed wilderness. Military aircraft noise in the vicinity of Hill Air Force Base, Utah diminisbed the "outstanding opportunity for solitude" aspect in nearby potential wilderness under inventory that it did not qualify for continued review. Biddulph, 1980	Because of the montane nature of local wilderness, vistas and unimpeded views above timberline with a line of sight often reaching 50 miles or more, the visual imposition of M-X on wilderness can be extensive because none of the potential wilderness areas are over 50 miles from project features.
Competition for Resources	N/A	Change in the visual nature of what is now an essentially rural, wild landscape will result in the project competing for visual or aesthetic resources. Litton, 1972 Harmon, 1980
Stress on Growing Economy	Local overflights of private and commercial aircraft may, if precedent holds, have to detour around, or fly above a minimum height above wilderness (e.g., Ventana and Sespe Wilderness and the California Condor)	Local overflights of private and commercial aircraft may, if precedent holds, have to detour around or fly above a minimum height above wilderness (e.g., Ventana and Sespe Wilderness and the California Condor).
Preservation of Biophysical and Cultural Resources	Local overflights of private and commercial aircraft may, if precedent holds, have to detour around, or fly above a minimum height above wilderness (e.g., Ventana and Sespe Wilderness and the California Condor). Increased noise will compromise wilderness quality and character particularly during construction. Hendee et al., 1978	Increased noise will compromise wilderness quality and character particularly during construction. Hendee et al., 1978 Change in the visual nature of what is now an essentially rural, wild landscape will result in the project competing for visual or aesthetic resources. Litton, 1972 Harmon, 1980

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in Wah Wah Valley, and the Intermountain Power Project (IPP) near Delta would cause additional land disturbance and population growth. Construction activities for most of these projects would be small compared to that for M-X, and the cumulative effects are expected to be small. As for the combined effects of population growth, projected population increases from construction and operation of the other projects would be small compared to that for M-X. IPP is the exception where population increases would be similar to that of M-X during construction of both projects.

The population-related effects of the project are additive in terms of projected population trends. According to the University of Utah, Bureau of Economic and Business Research (August, 1980), in the absence of M-X, the region including major cities of Las Vegas and Salt Lake City is expected to nearly double in population over the next twenty years, realizing an increase of about 750,000 people. About 31,000 people of this total increase will be due to M-X. However, calculations show that M-X will be responsible for approximately 30 percent of the anticipated deployment region population increase during construction between 1982 and the peak year 1987. This gives roughly 85,000 people using the wilderness resource of whom approximately 4,250 - 8,000 will be due to M-X. Using the same rates of potential wilderness use calculated above (5-10 percent), one would expect an overall increase in wilderness use by 1987 to amount to about 30,000 people. In contrast to the additive effects of population due to the projected spectrum of projects, because of the project-related road network, M-X will act in a synergistic fashion to disperse the user population and render wilderness more accessible. Additionally, the legislative constitution of wilderness as "designated" is likely to render newly classified wilderness more attractive (Hendee, 1978). Even in areas some distance from population centers such as designated wilderness in Montana, 15 to 42 percent of visitors originated out of state. Similar percentages can be expected when potential wilderness within the DDA is designated. These visitations may add to M-X related and endemic growth. Using the figures provided by the SAC survey (Haagen, 1980), an estimated 10 percent increase in recreational use of wilderness is expected to occur as a result of project implementation.

Project-related wilderness users are expected primarily to originate from OB population centers. Again taking the figures provided by the Bureau of Economic and Business Research (University of Utah 1980) for county by county projected population increases, locating a base at Coyote Springs will add an estimated 27,000 people to the baseline population by 1986 (an increase of 5 percent over baseline). Siting a base at Milford will result in a 300 percent population increase (17,000) over baseline. The extent to which wilderness areas in the vicinity of these OBs will experience additional use will depend upon the recreational preferences of the immigrants. Using the 10 percent figure discussed previously, wilderness areas in the vicinity of

Coyote Springs could receive, on the average up to 2700 additional visitors, while those in the vicinity of Milford could receive up to 1700 additional visitors. The impact to wilderness will be proportional to the density of people, density of people in any one area being a function of distance travelled as well as the attractiveness of the site.

The impact this additional use will have on the wilderness resource will be determined by the carrying capacity; of the particular area visited. Carrying capacity is that critical number of visitors above which degradation of ecological characteristics or reduction of the quality of the wilderness experience occurs. A quantifiable measure of M-X population-related effects would be that degree to which the influx to M-X related population causes the carrying capacity to be exceeded. At this level, no more visitors would be admitted. However, it is difficult to demonstrate M-X impacts for several reasons: (1) carrying capacities have not been determined by appropriate authorities (BLM, USFS) for many of the areas as comprehensive visitor use data are incomplete or not available; (Schuldt, 1980; Schochat, 1980; Onvif, 1980; Harmon, 1980; Biddulph, 1980). (2) Wilderness is a limited resource managed by its own characteristics rather than user demand. Demand in excess of capacity results in waiting lines, rather than increased additions to the system. Having to register and wait for a "wilderness experience" in itself constitutes a degradation of that experience. Finally, both the Wilderness Act of 1964 and FLPMA (1976) prohibit significant impact from recreational overuse.

"Productivity" of wilderness can be considered the sustainable carrying capacity for human use and enjoyment, that is, the human use that can occur without degrading ecological characteristics or reducing the quality of the wilderness experience. Overuse or encroachment by audio or visual evidence of human activities (i.e., construction or crowding) will reduce the carrying capacity ("productivity"), for example by rendering the periphery, where noise of construction or trail-head crowds are experienced, not wilderness. Using this concept, the major reduction productivity may occur when there is maximum construction activity and human population in proximity to the wilderness.

The effects of M-X construction would reduce short-term productivity of wilderness particularly in areas where project features are sited within 1 mile of the resource. Over 60 percent of the hydrologic sub-units having WSAs within the DDA fall within this category. It is impossible to estimate the absolute level of this reduction from existing data. Worst case valleys would include Snake, Little Smoky, Hot Creek, Coal, Railroad, Cave, Lake, Patterson White River, Pahranagat, and Coyote Springs. The reduction in long-term productivity relative to wilderness over-use is anticipated to be relatively small since appropriate management policies are expected to be implemented to preserve wilderness character. However, due to the pervasive nature

of the project, reduction in long-term productivity relative to permanent alteration of scenic landscapes from vista points in montane wilderness will transcend the life of the project. The reduction in long-term wilderness productivity as compared to projections without M-X is anticipated to be relatively large due to the extensive nature of the project.

The visual impact of the project features upon wilderness users in the many areas that offer sweeping vistas of large portions of the Great Basin will be virtually permanent and constitute an irreversible and irretrievable committment of resources. This is particularly so since many of the wilderness areas are located in montane and even in alpine environments far above valley floors with little to obstruct the view. Project related noise, on the other hand, will be temporary and ephemeral. Human overuse, if reduced or eliminated, is, for the most part, reversible and retrievable because of biological succession, reinvasion and colonization.

Roads and vehicles exist and can be seen from proposed wilderness areas. Current use would seem to constitute an existing compromise, however, the disturbance is a matter of scale. Measurements (by a line drawn on the long axis and perpendicular to it at mid-point) in the 11 most sensitive valleys to project effects (see Table 6) indicate an average of 20 intersections of roads per valley. These valleys will have an average of 25 intersections with the project. Discussions with BLM personnel (Harmon, 2980) indicate that in or near the DDA about 10-15 potential wilderness study areas were eliminated from consideration or had their boundaries withdrawn because of roads, stacks and other visible human intrusions emanating from outside of the area. The BLM policy is currently developing toward consideration of audio-visual effects on wilderness. Currently the threshold at which an external influence comprises wilderness quality is subjectively determined by BLM personnel.

It is difficult to separate the project effects from the projected population growth of the Nevada-Utah region without M-X. Further, there are many values of wilderness - companionship, solitude, self-testing, and escape that may be little affected by the temporary noise of construction and the permanent visual impact of the project. However, visual and noise pollution are a matter of concern to EPA, the U.S. Forest Service, and other agencies. Standards for visual and noise factors are presently being created for undeveloped public lands (litton, et al., 1980).

As further evidence of agency and public concern for the issue of preservation of aesthetic resources (vis-a-vis wilderness) in an analysis of issues raised during the scoping process, the Bureau of Land Management (Summary of SCOPING for the M-X - ETR-225, 1980) limned the issue of audio and visual impacts due to M-X noting "the M-X project will create significant changes in the land-forms - changes in opportunity for

dispersed and primitive forms of recreation . . . all actions occurring on BLM - managed lands which affect the appearance of the landscape are required under FLPMA and Bureau policy to be considered in terms of visual resource management objectives. These objectives require that such actions be understood and managed to be compatible with the natural character and visual quality of the landscape. Therefore, all phases of the M-X project must include considerations for scenic quality . . .". These sentiments reflect the thrust of The Wilderness Act of 1964 which defines wilderness (in part) as ". . . an area, primarily affected by the forces of nature, with the imprint of man's work substantially unnoticeable." The selection of 6 miles from project construction and features as a reasonable boundary to preserve a sense of wilderness follows norms in the literature. In national forests of the western United States, middleground distances useful in revealing "man-made changes and landscape conflicts" range up to 5 miles (probably more in the Great Basin) (Litton, 1977).

The overall consequences of the previously discussed effects will be a reduction in the wilderness character of the Great Basin. If one reflects upon the legislative intent to provide a wilderness "heritage" for present and future generations, then the project will create irreversible and irretrievable effects. That is, persons using the wilderness for recreation may find the visual effects of the project an occasional annoyance. However, the sense of knowing there is a remaining heritage of vast, undeveloped open spaces will be permanently compromised when project elements dissect the Great Basin. The Great Basin region is one of the few locales in the lower 48 states where such a heritage could be protected. All remaining de facto wilderness is presently undergoing Congressional review and classification. What is certain is that the project will effectively close off the area as having a wilderness option and foreclose its current image as a genuine last frontier characterized by relict American life styles and wide open spaces. Additional consequences are summarized in Tables 9 and 10.

Predicted effect levels and their significance are summarized in Table 11 for each hydrologic subunit in which project elements would be deployed. The dispersed nature of po ulation - related effects would generate anticipated impacts to nearby or adjacent hydrologic sub-units having no project elements. The difficulty with predicting the actual level of impact resulting from increased wilderness use was discussed previously along with the subsequent development of an effect index to which a measured impact could be correlated.

Mitigation measures to be taken to reduce or compensate for significant adverse impacts include:

- Provision of a one mile, or greater if possible, buffer zone around the perimeter of each potential wilderness.

Table 11. Potential impact to wilderness in Nevada/Utah DDA for the Proposed Action and Alternatives 1-6.

HYDROLOGIC SUBUNIT NO.	HYDROLOGIC SUBUNIT NAME	APPROXIMATE ACRES OF WILDERNESS WITHIN THE SUBUNIT	SHORT-TERM IMPACTS[1] PEOPLE RELATED	SHORT-TERM IMPACTS[1] VISUAL AND NOISE RELATED	LONG-TERM VISUAL IMPACTS[2]
	Subunits with M-X Clusters and DTN				
4	Snake	104,000			
5	Pine	12,000			
6	White	122,000			
7	Fish Springs	48,000			
8	Dugway	—			
9	Government Creek	—			
46	Sevier Desert	34,000			
46A	Sevier Desert & Dry Lake[3]	52,000			
54	Wah Wah	26,000			
137A	Big Smoky-Tonopah Flat	10,000			
139	Kobeh	3,000			
140A	Monitor—Northern	—			
140B	Monitor—Southern	—			
141	Ralston	—			
142	Alkali Spring	—			
148	Cactus Flat	11,000			
149	Stone Cabin[3]	31,000			
151	Antelope	2,000			
154	Newark[3]	—			
155A	Little Smoky—Northern	61,000			
155C	Little Smoky—Southern				
156	Hot Creek	147,000			
170	Penoyer	20,000			
171	Coal	24,000			
172	Garden	91,000			
173A	Railroad—Southern	80,000			
173B	Railroad—Northern	242,000			
174	Jakes	—			
175	Long	—			
178B	Butte—South	9,000			
179	Steptoe	29,000			
180	Cave	75,000			
181	Dry Lake[3]	—			
182	Delamar	23,000			
183	Lake	72,000			
184	Spring	8,000			
196	Hamlin	9,000			
202	Patterson	40,000			
207	White River	77,000			
208	Pahroc	45,000			
209	Pahranagat	142,000			
	Overall DDA Impact				

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[1,2]
- [1] (No impact.)
- [2] (Less than 5,000 acres of wilderness within 6 mi of M-X system.)
- [1] (More than 30 acres of wilderness available per person during peak year of construction.)
- [2] (Value not used.)
- [1] (More than 10 but less than 30 acres of wilderness available per person during peak year of construction.)
- [2] (5,000 to 55,000 acres of wilderness within 6 mi of M-X system.)
- [1] (Less than 10 acres of wilderness available per person during peak year of construction.)
- [2] (More than 55,000 acres of wilderness within 6 mi of M-X system.)

[3] Conceptual location of Area Support Centers (ASCs).

- AF cooperation with appropriate managing agency (BLM, USFS, USFWS) in development of mitigation strategies.

OPERATING BASE IMPACTS

Proposed Action:

As currently planned, three elements of the proposed Coyote OB, as the primary base, would directly impact portions of three designated wilderness study areas (WSAs). Figure 5 shows the intersection of the base elements with these areas. The proposed airfield conceptual location and surrounding area would impact WSA # NV-050-0201, Fish and Wildlife #1. The proposed base housing would impact WSA # NV-050-0156, Meadow Valley Range. The DTN segment leading to Delamar Valley and a secondary location for on-base housing would impact WSA # N5-050-0177, Delamar Mountains. That portion of the DTN would also have the potential to impact parts of WSA # N5-050-0IR-16, an unnamed WSA. Under current law, these direct impacts would not be allowed. All designated wilderness study areas are legally excluded from such encroachments. An Act of Congress would be required in order to construct any program feature within wilderness areas under review. As a result of base operations, WSA # NV-050-0215 and -0216 would be expected to experience an indeterminable amount of degradation in wilderness quality. Most of the loss would result from increased noise and visual polluation associated with more military and urban land uses.

A further potential impact to the wilderness areas adjoining the proposed base could result from the siting of the OBTS. The program feature would, most likely, be sited along the DTN leading toward Delamar Valley. It must be located on geotechnically suitable area between the primary OB and the first clusters in the DDA. Specific impact assessment cannot be completed until this feature is sited.

The movement of base features within the area delineated for the potential base would modify impacts to the potentially jeopardized wilderness study areas. Exact siting of all features would be required for the precise estimation of areas within WSA which would be disturbed. Using existing estimates, approximately 10 square miles of the Delamar Mountain WSA and 22 square miles of the Fish & Wildlife WSA are within the proposed OB suitability zone. Contiguous with the present suitability area configuration are the southern portion of the Meadow Valley Mountains and the northern portion of the Arrow Canyon Range.

The consequences of the previously discussed effects on the WSAs would be permanent wilderness loss. This loss represents an irreversible and irretrievable commitment of resources, not replaceable through mitigation measures. The effects of construction activites are unavoidable if the present plan for the Coyote Springs OB is implemented.

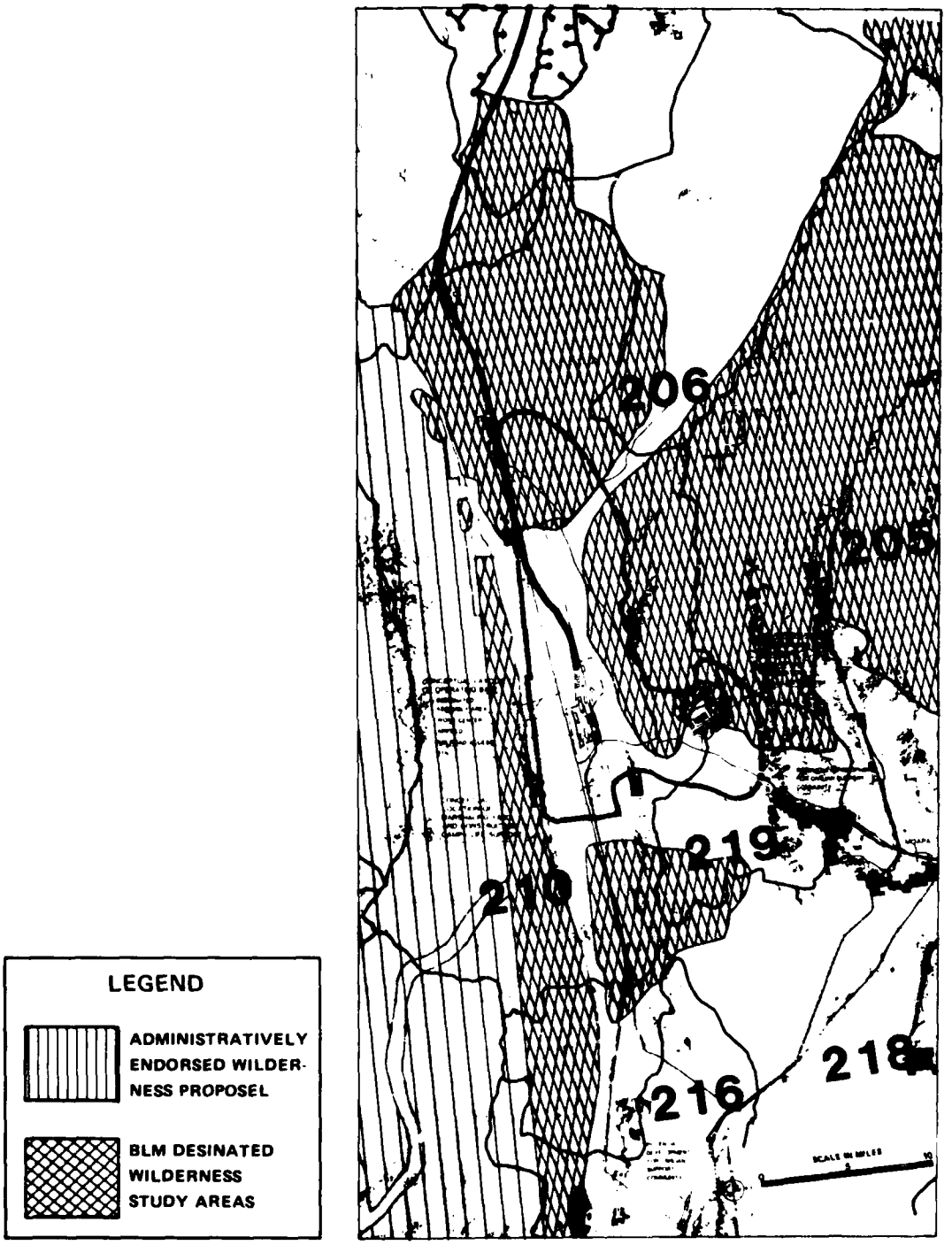

Figure 5. Wilderness under review in the vicinity of the Coyote Spring operating base.

An influx of an estimated 16,000 permanent residents to the Coyote Springs area is anticipated with project implementation. The effects of this large human population growth would be expected to increase use of the wilderness resources in the area - and will vary with the socio-economic and demographic characteristics of the immigrants. A general summary of potential consequences relative to the four issue areas is provided in Tables 9 and 10.

Hydrologic sub-units were ranked for low, moderate, or high potential impact based on the total mean indirect effects index (ETR 30) for all wilderness in a given watershed. Table 12 summarizes wilderness abundance and level of population-related effects on a hydrologic subunit basis with Coyote Springs as Operating Base A for the Proposed Action. Subunits expected to have a high potential for impact include Coyote Spring, Muddy River Spring, Pahranaget, Delamar, and Beryl Enterprise. Sixteen additional subunits would be particularly attractive for wilderness visitation.

According to the indirect analysis, regions outside the DDA anticipated to receive increased visitation by merit of their popular wilderness areas include the southern portion of Beryl-Enterprise for Pine Valley Mountain, and the Colorado River drainage for Zion National Park, Cedar Breaks and Bryce Canyon National Monuments as well as RARE II wilderness recommendation, Ashdown Gorge.

There are no wilderness areas present within the immediate vicinity of the Milford OB site. The closest wilderness study area is the recommended Wah Wah Mountains approximately 30 miles north-northwest of the base.

A projected long term population increase of approximately 13,000 is anticipated for the Milford area as a result of base siting. As discussed in the previous section, effects of such growth - increased use of wilderness areas and associated impacts - will be largely unavoidable. According to the indirect effects index developed for OB impact analysis (ETR 30) hydrologic sub-units with critically high effect index and thus high potential impact levels would include: Snake, Pine, White, Wah Wah, Cave, Lake and Hamlin. Additional subunits outside the DDA anticipated to receive increased visitation from M-X related personnel are the same as those already discussed for Coyote Springs. Table 12 summarizes wilderness abundance and level of population related impacts by hydrologic subunit with Milford as base B for the proposed action.

Alternative 1:

The DDA, first OB, and associated impacts would be the same as for the proposed action. The second OB would be located at Beryl, Utah.

Table 13. Potential population-related impacts to wilderness around operating bases for the Proposed Action and Alternatives 1-8. (page 1 of 2)

HYDROGRAPHIC SUBUNIT OR COUNTY		APPROXIMATE ACRES OF WILDERNESS WITHIN THE SUBUNIT	LONG-TERM POPULATION-RELATED POTENTIAL IMPACT[1]		
NO.	NAME		BERYL, UTAH OB (ALT 1,3,4)	COYOTE SPRING VALLEY NEVADA OB (P.A. & ALT 1,2,4,6,8)	DELTA, UTAH OB (ALT 2)
	Subunits or Counties within OB Suitability Area				
46	Sevier Desert	34,000			
46A	Sevier Desert-Dry Lake[2,4]	52,000			
5C	Milford[3]	—			
52	Lund District	—			
53	Beryl-Enterprise	2,000			
179	Steptoe	29,000			
210	Coyote Springs	433,000			
219	Muddy River Springs	88,000			
	Curry County, NM	—			
	Hartley County, TX[3]	—			
	Other Affected Subunits or Counties				
4	Snake	104,000			
5	Pine	12,000			
6	White	122,000			
7	Fish Springs	48,000			
8	Dugway	—			
9	Government Creek	—			
46	Sevier Desert	34,000			see above
46A	Sevier Desert-Dry Lake[2,4]	[illegible],000			see above
5C	Milford[3]	—			
52	Lund District	—	see above		
53	Beryl-Enterprise	2,000	see above		
54	Wah Wah	26,000			
137A	Big Smoky-Tonopah Flat	10,000			
139	Kobeh	3,000			
140A	Monitor—Northern	—			
140B	Monitor—Southern	—			
141	Kalston	—			
142	Alkali Spring	—			
148	Cactus Flat	11,000			
149	Stone Cabin[3]	31,000			
151	Antelope	2,000			
154	Newark[3]	—			
155A	Little Smoky—Northern	61,000			
155C	Little Smoky—Southern	see North			
156	Hot Creek	147,000			
170	Penoyer	20,000			
171	Coal	24,000			
172	Garden	91,000			
173A	Railroad—Southern	80,000			
173B	Railroad—Northern	242,000			
174	Jakes[3]	—			
175	Long	—			
178	Butte	9,000			
179	Steptoe	29,000			
180	Cave	75,000			
181	Dry Lake[2,4]	—			
182	Delamar	23,000			
183	Lake	72,000			
184	Spring	8,000			
196	Hamlin	9,000			
202	Patterson	40,000			
207	White River	77,000			
208	Pahroc	45,000			
209	Pahranagat	142,000			
210	Coyote Springs	433,000		see above	
219	Muddy River Springs	88,000		see above	
	Chaves County, NM	Salt Creek and Mescalero Sands			
	Overall Impact for OB				

3849-2

No potential impact.

Low potential impact.

Moderate potential impact.

High potential impact.

[1]A population-related indirect effect index for OB impact analysis was developed using linear distance from the population center and attractiveness of a particular wilderness site. A detailed discussion of the methodology is contained in ETR 30.

[2]Conceptual location of Area Support Centers (ASCs) for Proposed Action and Alternatives 1-6.

[3]Conceptual location of Area Support Centers (ASCs) for Alternative 7.

[4]Conceptual location of Area Support Centers (ASCs) for Alternative 8.

Table 12. Potential population-related impacts to wilderness around operating bases for the Proposed Action and Alternatives 1-8. (page 2 of 2)

HYDROLOGIC SUBUNIT OF COUNTY		APPROXIMATE ACRES OF WILDERNESS WITHIN THE SUBUNIT	LONG-TERM POPULATION-RELATED POTENTIAL IMPACT			
NO.	NAME		ELY, NEVADA OB (ALT. 3-5)	MILFORD, UTAH OB (ALT. 5,6)	CLOVIS, NEW MEXICO OB (ALT. 7,8)	DALHART, TEXAS OB (ALT. 7)
	Subunits or Counties within OB Suitability Area					
46	Sevier Desert	34,000				
46A	Sevier Desert-Dry Lake[4,5]	52,000				
50	Milford[5]	–				
52	Lund District	–				
53	Beryl-Enterprise	2,000				
179	Steptoe	29,000				
210	Coyote Springs	433,000				
219	Muddy River Springs	88,000				
	Curry County, NM	–				
	Hartley County, TX[1]	–				
	Other Affected Subunits or Counties					
4	Snake	104,000				
5	Pine	12,000				
6	White	122,000				
7	Fish Springs	46,000				
8	Dugway	–				
9	Government Creek	–				
46	Sevier Desert	34,000				
46A	Sevier Desert-Dry Lake[4,5]	52,000				
50	Milford[5]	–				
52	Lund District	–				
53	Beryl-Enterprise	2,000				
54	Wah Wah	26,000				
137A	Big Smoky-Tonopah Flat	10,000				
139	Kobeh	3,000				
140A	Monitor—Northern	–				
140B	Monitor—Southern	–				
141	Ralston	–				
142	Alkali Spring	–				
148	Cactus Flat	11,000				
149	Stone Cabin[3]	31,000				
151	Antelope	2,000				
154	Newark[3]	–				
155A	Little Smoky—Northern	61,000				
155C	Little Smoky—Southern	see North				
156	Hot Creek	147,000				
170	Penoyer	20,000				
171	Coal	24,000				
172	Garden	91,000				
173A	Railroad—Southern	80,000				
173B	Railroad—Northern	242,000				
174	Jakes[3]	–				
175	Long	–				
178	Butte—South	9,000				
179	Steptoe	29,000	see above			
180	Cave	75,000				
181	Dry Lake[3,6]	–				
182	Delamar	23,000				
183	Lake	72,000				
184	Spring	8,000				
196	Hamlin	9,000				
202	Patterson	40,000				
207	White River	77,000				
208	Pahroc	45,000				
209	Pahranagat	142,000				
210	Coyote Springs	433,000				
219	Muddy River Springs	88,000				
	Chaves County, NM	Salt Creek and Mescalero Sands				
	Overall Impact for OB					

3849-2

[1] No potential impact.

Low potential impact

Moderate potential impact.

High potential impact

[1]A population-related indirect effect index for OB impact analysis was developed using linear distance from the population center and attractiveness of a particular wilderness site. A detailed discussion of the methodology is contained in ETR 30.

[3]Conceptual location of Area Support Centers (ASCs) for Proposed Action and Alternatives 1-6

[4]Conceptual location of Area Support Centers (ASCs) for Alternative 7

[5]Conceptual location of Area Support Centers (ASCs) for Alternative 8

There are no potential wilderness areas in the immediate vicinity of the proposed second base. The closest wilderness is the RARE II recommended Pine Valley Mountain region approximately 25 miles south-southeast of the base site.

Impacts of an OB in this area would stem from the indirect effects of the movements and recreational activities of an estimated 12,800 additional permanent residents in the Beryl region. Although recreational use preferences will be a function of the socioeconomic and demographic characteristics of the inmigrants, using the indirect effect index for OB analysis as discussed in ETR 30, it is possible to identify the key hydrologic subunits targeted for increased wilderness visitation. These include the Snake, Cave, Lake, Hamlin and Patterson subunits. Table 12 summarizes wilderness abundance and level of population related-effects.

Alternative 2:

The DDA, first OB, and associated impacts would be the same as for the proposed action. The second OB would be located near Delta. There are no wilderness areas intersecting the OB suitability zone. The nearest WSA is the recommended Swasey Mountains approximately 10 miles northwest of the base location. Additional nearby areas include the designated WSAs Howell and Notch Peak located 10 and 16 miles, respectively, to the west of the proposed site.

An influx of an estimated 14,000 permanent residents to the Delta area is expected as a result of base siting. Using the indirect effect index generated for OB impact analysis (ETR 30), hydrologic subunits anticipated to receive increased wilderness use would include Snake, White, Fish Springs, and Sevier Desert and Sevier Desert/Dry Lake. Table 12 summarizes wilderness abundance and level of population-related effects.

Alternative 3:

The DDA and associated impacts would be the same as for the proposed action. Using Beryl as the primary base location for Alternative 3 would result in an increase of 17,000 long-term residents in the area - approximately 30 percent more than Alternative 1 with Beryl as a second base. Although these figures differ there is no qualitative change in the potential population-related effects of an OB location at Beryl.

The second OB would be located near Ely. There are no potential wilderness areas within the proposed Ely OB suitability zone. The nearest wilderness areas are the designated WSAs, South Egan Range and Mt. Grafton located 18 and 20 miles, south-southwest and south respectively. The impacts to wilderness by locating an OB in the vicinity of Ely would stem from the recreational activities of an estimated 14,000 additional permanent residents in the region. Using the indirect effect index for OB impact analysis (ETR 30), it is possible

to identify candidate hydrologic subunits for increased wilderness use. Those targeted for high impact are Snake, White, Hot Creek, Railroad northern, Steptoe, Cave, Lake, Hamlin, and White River. Table 12 summarizes wilderness abundance and level of population-related effects.

Alternative 4:

The DDA and associated impacts would be the same as for the Proposed Action. Impacts for the first OB at Beryl are the same as for Alternative 3.

Impacts for the proposed OB location at Coyote Spring are discussed under the Proposed Action. Although the siting of Coyote Springs as a secondary base would reduce the influx of permanent residents by about 24 percent, there would be substantial changes in the indirect population-related effects of an OB location in this region. Table 12 summarizes wilderness abundance and level of population-related effects.

Alternative 5:

Impacts for the proposed OB location at Milford are discussed under the Proposed Action. Using Milford as the primary base would result in an estimated 30 percent increase in permanent residents over that projected for Milford as a second base but no substantial qualitative changes in the anticipated effects on wilderness areas. Hydrologic subunits specifically targeted for potential impact as a result of first OB include Snake, Pine, White, Wah Wah, Cave, Lake, and Hamlin (Table 12). Impacts for the proposed Ely OB are the same as for Alternative 3.

Alternative 6:

The DDA and associated impacts would be the same as for the Proposed Action. Impacts for a first OB at Milford and a second OB at Coyote Spring are the same as those for Alternatives 5 and 4 respectively. Table 12 summarizes wilderness abundance and level of population-related effects on a hydrologic subunit basis for Alternative 6.

Alternative 7:

There are three wilderness areas in the Texas-New Mexico study region: Salt Creek Wilderness Area, and the Sabinosa and Mescalero Sands Designated Wilderness Study Areas. Of these, the first two are located well outside the DDA, and thus the impact potential by project-related activity would be low. However, in the conceptual layout, Mescalero Sands, in Southern Chaves County, New Mexico is surrounded by clusters (Figure 6).

Construction impacts would be comparable to those discussed for the Proposed Action, except that the low physical relief of the Texas/New Mexico area would limit the visual impacts from construction activities

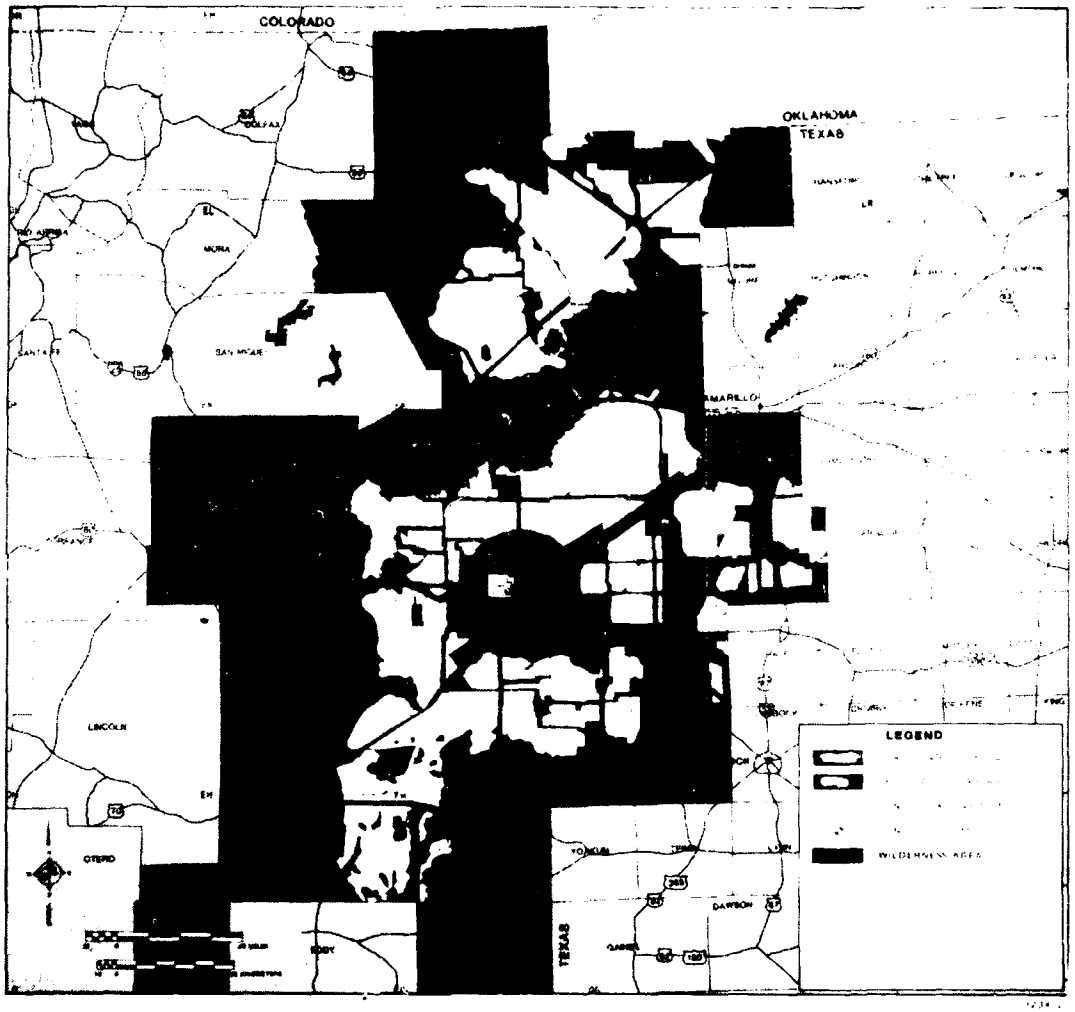

Figure 6. Relationship between key natural areas and Alternative C proposed activities.

(See Figure 4.3.1.10-4, Page 4-249 of DEIS)

to a minimal distance inside the WSA. Construction noise impacts could still be significant (Table 13). Both OB sites are over 200 miles by road from Mescalero Sands, and thus no significant direct or indirect effects are anticipated.

Alternative 8:

Figures 7 and 8 show proximity of wilderness to project elements for the Nevada/Utah and Texas/New Mexico portions, respectively, of the split basing alternative. Deploying half the project in Nevada/Utah would reduce by about 40 percent the number of hydrologic subunits containing project elements and having high potential for impact to wilderness (Table 14). According to the indirect effects index generated for OB impact analysis, hydrologic subunits likely to receive increased wilderness related recreational use with Coyote Spring as the base site for the Nevada/Utah portion of the split-basing alternative would include Coyote Spring, Muddy River Springs, Beryl-Enterprise, Delamar, and Pahrangat (Table 12). In Texas/New Mexico, the overall project area is also reduced by about half, but the proximity to wilderness is the same as full basing.

Deployment of the DDA necessary for the split basing alternative would cause changes in visual aesthetics, noise levels, air quality, and in population numbers as discussed for the proposed action and Alternative 7. The potential for combined effects of M-X and other projects planned for the Nevada/Utah study area would be reduced since the Anaconda Molybdenum project and most of the potential site for the White Pine Power Project would be outside the deployment area. Interactions with Alunite, Pine Grove Molybdenum, IPP and Allen Warner could still occur. No significant large scale power or mining projects are known to be planned for the Texas/New Mexico area.

For the consequences of project-related effects on the wilderness resource are qualitatively the same as those described for the Proposed Action and for Alternative 7. Table 14 summarizes the estimated DDA impact on the wilderness resource for each hydrologic subunit in which project elements would be deployed for split basing. In Nevada and Utah, significant impacts to wilderness are predicted for 5 of the 22 hydrologic subunits containing project elements. Long term effects are the same as that discussed for full basing. In Texas and New Mexico, both direct and indirect effecgs for this alternative would be the same as those described for Alternative 7 and are not significant.

Mitigation measures that would reduce significant impacts resulting from project implementation are the same as those listed for the Proposed Action and Alternative 7.

Table 13. Potential impact to wilderness in Texas/New Mexico around operating bases for Alternative 7.

COUNTY	WILDERNESS AREA	SHORT-TERM IMPACTS[1]	LONG-TERM IMPACTS[1]
Counties with OB Suitability Area			
Bailey, TX	—		
Castro, TX	—		
Cochran, TX	—		
Dallam, TX	—		
Deaf Smith, TX[2]	—		
Hartley, TX[2]	—		
Hockley, TX	—		
Lamb, TX	—		
Oldham, TX	—		
Parmer, TX	—		
Randall, TX	—		
Sherman, TX	—		
Swisher, TX	—		
Chaves, NM	Salt Creek and Mescalero Sands		
Curry, NM	—		
DeBaca, NM	—		
Guadalupe, NM	—		
Harding, NM	—		
Lea, NM	—		
Quay, NM	—		
Roosevelt, NM[2]	—		
Union, NM	—		
Overall Impact			

3850-2

[1]

No potential impact.

Low potential impact.

Moderate potential impact.

High potential impact.

[2]Conceptual location of Area Support Centers (ASCs).

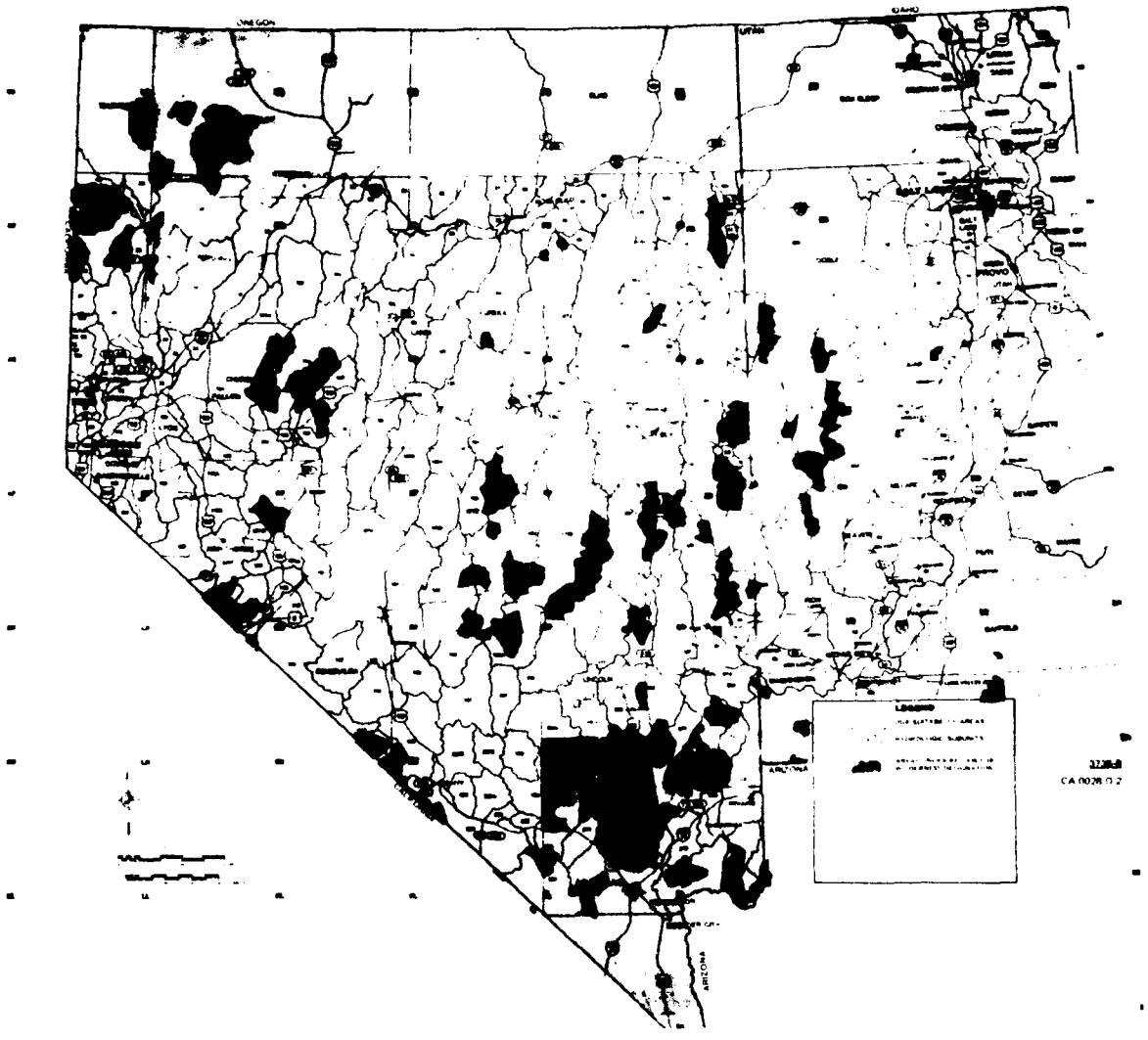

Figure 7. Wilderness and project layout for Nevada/Utah, Alternative 8.

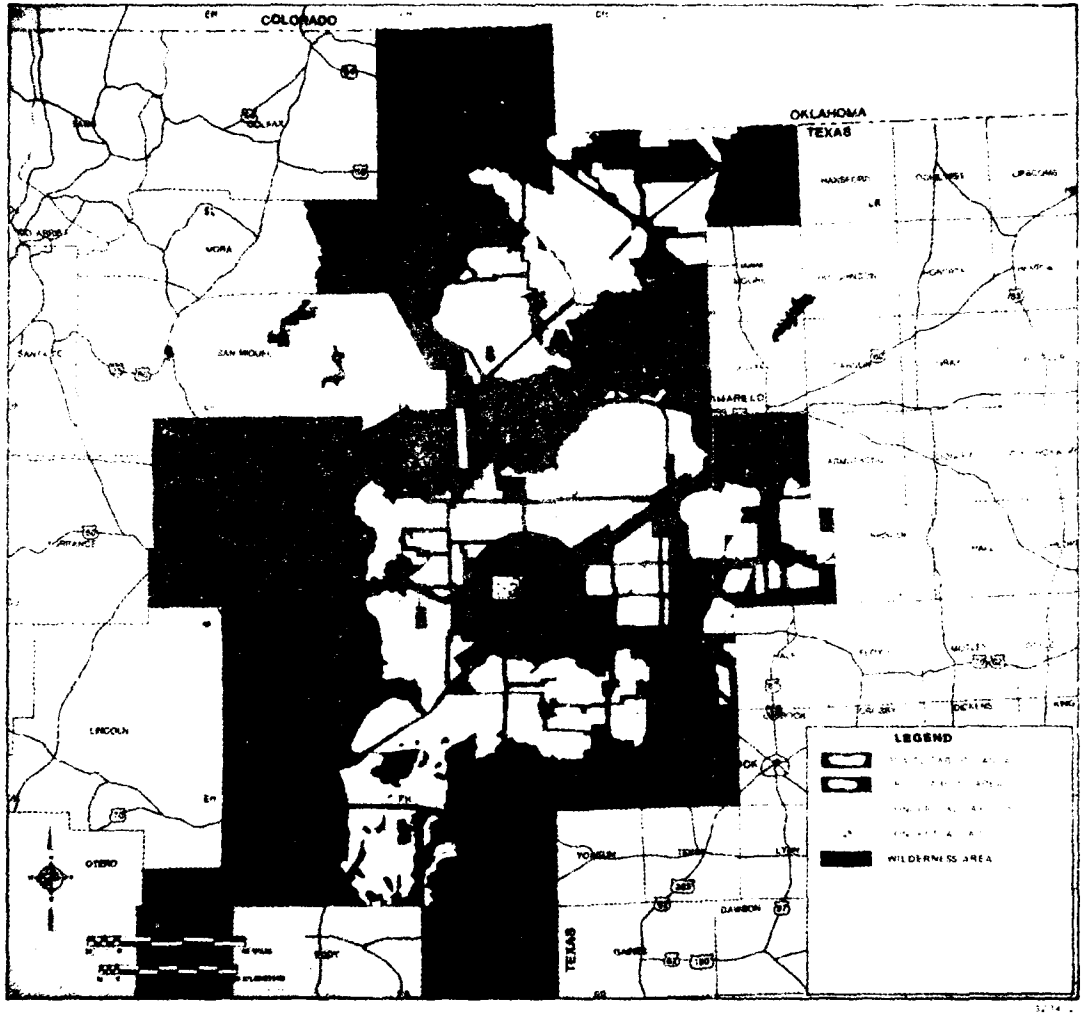

Figure 8. Wilderness and project layout for Texas/New Mexico, Alternative 8.

(See Figure 4.3.1.10-4, Page 4-249 of DEIS)

Table 14. Potential impact to wilderness in Nevada/Utah and Texas/New Mexico DDAs for Alternative 8.

HYDROLOGIC SUBUNIT OR COUNTY		APPROXIMATE ACRES OF WILDERNESS WITHIN THE SUBUNIT	SHORT-TERM IMPACTS[1]		LONG-TERM VISUAL IMPACTS[2]
NO.	NAME		PEOPLE RELATED	VISUAL AND NOISE RELATED	
	Subunits or Counties with M-X Clusters and DTN				
4	Snake[3]	104,000			
5	Pine	12,000			
6	White	122,000			
7	Fish Springs	48,000			
46	Sevier Desert	34,000			
46A	Sevier Desert & Dry Lake	52,000			
54	Wah Wah	26,000			
155	Little Smoky	10,000			
156	Hot Creek	147,000			
170	Penoyer	20,000			
171	Coal[3]	24,000			
172	Garden	91,000			
173A	Railroad—Southern	80,000			
173B	Railroad—Northern	242,000			
180	Cave	75,000			
181	Dry Lake	—			
182	Delamar	23,000			
183	Lake	72,000			
184	Spring	8,000			
196	Hamlin	9,000			
202	Patterson	40,000			
207	White River	77,000			
	Bailey, TX	—			
	Cochran, TX	—			
	Dallam, TX	—			
	Deaf Smith, TX	—			
	Hartley, TX	—			
	Hockley, TX	—			
	Lamb, TX	—			
	Oldham, TX	—			
	Parmer, TX	—			
	Chaves, NM	Salt Creek Wilderness & Mescalero Sands			
	Curry, NM	—			
	DeBaca, NM	—			
	Guadalupe, NM	—			
	Harding, NM	—			
	Lea, NM	—			
	Quay, NM	—			
	Roosevelt, NM	—			
	Union, NM	—			
	Other Affected Subunits				
208	Pahroc	45,000			
209	Pahranagat	142,000			
	Overall Impact — Nevada/Utah				
	Overall Impact — Texas/New Mexico				

3851-1

[1,2]

[1](No impact.)

[2](Less than 5,000 acres of wilderness within 6 mi of M-X system.)

[1](More than 30 acres of wilderness available per person during peak year of construction.)

[2](Value not used.)

[1](More than 10 but less than 30 acres of wilderness available per person during peak year of construction.)

[2](5,000 to 55,000 acres of wilderness within 6 mi of M-X system.)

[1](Less than 10 acres of wilderness available per person during peak year of construction.)

[2](More than 55,000 acres of wilderness within 6 mi of M-X system.)

[3]Conceptual location of Area Support Centers (ASCs).

COMPARISON OF ALTERNATIVES

Alternative 7 is the preferred alternative from the standpoint of the wilderness resource since (1) there are only three wilderness areas in the Texas/New Mexico study region -- the Salt Creek Wilderness and the Sabinosa and Mescalero Sands Wilderness study areas, and (2), of these, according to the present conceptual layout, only the Mescalero Sands Wilderness study area in southern Chaves County, New Mexico stands to be substantially impacted by project-related activity. Alternatives 5 and 3, in that order, would be the best overall with respect to the Nevada/Utah wilderness resource since no potential wilderness areas lie within the proposed OB suitability zones.

The ordinal ranking of these alternatives was based upon the indirect effects model (ETR 30) developed to predict potential wilderness areas most likely to be impacted by recreation-related impacts. The model assumes the potential effects of basing sites to be a function of OB population as well as the distance from the base to the resource and recreational appeal of the area. The split basing Alternative 8 would be the next preferred despite the fact that the Coyote Spring base suitability zone overlaps surrounding designated wilderness study areas since it reduces project-related population growth and reduces the number of hydrologic subunits containing project elements by approximately 40 percent over full basing. Since there is the potential for direct project overlap with wilderness areas under review at the Coyote Spring site the remaining full-basing alternatives, which share this OB site are considered essentially equivalent. However, the ranking according to the indirect effect index discussed above shows some differentiation between these remaining full basing alternatives with the smallest population-related effects on the wilderness resource under Alternative 2 (Coyote/Delta) followed by Alternatives 6, Proposed Action, 4, and 1, in order of increasing potential for recreational impacts.

GENERAL IMPACTS TO SIGNIFICANT NATURAL AREAS: NEVADA/UTAH

Significant natural areas already withdrawn from the multiple use sustained yield aspects of public domain land (i.e., national/state parks, wildlife refuges, management areas, and so forth) would most likely be directly impaacted by project-related changes in air quality, noise levels, and groundwater use. It is not anticipated that project siting will occur within key natural area boundaries since it has been Air Force practice to avoid these regions. Impacts are expected to be local and short-lived during the construction phase activity burst when use of heavy machinery will produce increased ambient dust and noise levels in the vicinity of these lands. As with potential wilderness areas, proximity to M-X related construction and operation/activities could conceivably result in flora and fauna habitat deterioration or loss from possible reduction in water flow in low elevation springs as a result of water table lowering, and, depending upon their salient biological characteristics, impact discussions for vegetation, wildlife and/or aquatic species could also apply.

Other public domain lands containing as yet unidentified fragile ecosystems which are, nevertheless, de facto significant natural areas may be subject to direct impacts by construction within their boundaries. Potential impacts of this nature might include: (1) major habitat deterioration or loss, (2) possible alteration, reduction, and loss of genetic resources (Lovejoy, 1978), (3) loss of potential control areas for scientific research in addition to (4) landscape destruction of geologic and aesthetic interest. These potential impacts would be the result of project activities including the construction of roads, rail lines, clusters and protective structures, support facilities and communication towers, as well as borrow pits and disposal areas. Potential direct and indirect effects of construction and operation on significant natural areas are summarized in Table 15.

Direct effects of M-X deployment on significant natural areas are defined as destruction or disturbance of a particular key natural area as a direct result of construction and operation of the system. The general strategy of the analysis was (1) to determine the amount of each significant natural area disturbed and (2) to express it as a percent of the total resource abundance in each hydrologic subunit (Table 16). The analysis was based on the assumption that "shelter" locations serve as sample points of significant natural areas disturbed by project elements. Shelter counts were then multiplied by a factor equal to the total disturbed area for a hydrologic subunit divided by the total number of shelters in each hydrologic subunit. According to the present conceptual layout, significant natural areas in four hydrologic subunits appear to be directly impacted - all 1 percent or less (Table 16). These areas include portions of proposed Natural Landmark, Hot Creek Range and Valley, the Railroad Valley Wildlife Management Area, Diana's Punch Bowl in Monitor Valley, as well as the registered Natural Landmark, Hot Creek Springs and Marsh in Nye County, Nevada. Excluded from this analysis were the indirect population-related effects associated with the operating bases.

The potential for indirect or population-related effects of the project on key natural areas was determined by the "indirect effect index" developed for predicting areas targeted for potential recreational impacts (Table 15) associated with OB sites (ETR-30). As noted previously for the wilderness resource, the effect index was (1) based on the assumption that measurable indirect impacts would be normally distributed about the OB center and (2) is not a prediction of the actual level of impact on key natural areas, but rather an index to which measured recreational impacts should be correlated. The analysis used linear distance from a population center in addition to site attractiveness of a particular significant natural area. Based on this analysis, hydrologic subunits targeted for high, moderate, and low increases in recreational pressure were determined. The results are summarized in Table 17. Key natural areas outside the DDA anticipated to receive high increased recreational use include Zion National Park, Cedar Break National Monument, Bryce Canyon, Valley of Fire State Park, Red Mountain, as well as the Ruby Lake area.

Table 15. Potential impacts for various significant natural areas.

Type of Significant Natural Area[1]	Project Parameter[2]					Potential Impacts
	Area Disturbed	Water Use	Vehicle Traffic	Security	People	
Parks and Monuments (National & State)						Degradation in aesthetic quality where project construction is visible and where the presence of people and hierarchy cause increased noise leads up to about 5 miles.
						Lowering of water table with potential loss of surface water in lowland areas which might be corrected through connecting drainage systems.
						Potential loss of riparian and aquatic habitat resulting in concentration of people in remaining areas.
						Minimal effects expected
						Degradation in scenic vista quality and increased audible noise pollution up to about 5 miles in those areas through or near which vehicle traffic increases.
						Specific effects will be determined in Tier 2 studies.
						Increased visitation resulting in:
						Increased use and misuse of resources
						Disturbance to vegetation due to compaction and fire control.

Table 15. Potential impacts for various significant natural areas (continued).

Type of Significant Natural Area[1]	Project Parameter[2]					Potential Impacts
	Area Disturbed	Water Use	Vehicle Traffic	Security	People	
						Habitat destruction through vegetation removal, soil compaction and resultant erosion. Illegal harvesting/collecting Changes in animal behavior patterns due to habitat loss and increased noise levels. Concentration of wildlife with overgrazing and overbrowsing Increased fishing pressure Potential for decrease in animal populations through poaching. Increased litter and sanitation problems, attraction of nuisance organisms. Increased economic benefits because of concessions and other visitor related services.
Native Wildlife & Plant Centered Ecosystems (Federal & State Wildlife Refuges,						Degradation in aesthetic quality where project construction is visible and where the presence of people and machinery cause increased noise levels up to about 5 miles. Increased construction activities will tend to concentrate

Table 15. Potential impacts for various significant natural areas (continued).

Type of Significant Natural Area[1]	Project Parameter[2]					Potential Impacts
	Area Disturbed	Water Use	Vehicle Traffic	Security	People	
Ranges, and Management Areas; Unique & Nationally Significant Wildlife Ecosystems; Natural Landmarks)						diurnally feeding waterfowl within the refuge for longer periods of time resulting in a depletion of aquatic feeding ducks such as teal; grazing waterfowl (i.e. mallards and geese) will graze adjacent fields at night, while the puddle ducks (i.e. teal) will suffer from increased forage competition during the day. Potential for alteration of surface run off patterns affecting the water supply of water fowl areas and sensitive aquatic ecosystems. Potential for run off carring increased sediment loads as a result of vegetative cover less. Potential for run off contaminated by construction-related pollutants - oil, grease gasoline. Lowering of water table with potential loss of surface water in lowland areas which might be connected through connecting drainage systems. Potential loss of riparion and aquatic habitat resulting in a concentration of people in remaining areas. Degradation in scenic vista quality and increased audible noise pollution up to about 5 miles in those areas through or near which vehicle traffic occurs.

Table 15. Potential impacts for various significant natural areas (continued).

Type of Significant Natural Area[1]	Project Parameter[2]					Potential Impacts
	Area Disturbed	Water Use	Vehicle Traffic	Security	People	
						Potential for disturbance of wildlife behavior patterns.
				■	■	Specific effects to be determined in Tier 2 studies.
					■	Increased hunting pressure in water fowl areas resulting in:
						Increased litter and sanitation problems
						Increased potential for poaching
						Increased value of adjacent land for hunting leases.
						Increased visitation to springs, lakes, and riparian areas with the resultant recreational impacts associated with increased use and misuse of resources.
						Habitat destruction through vegetation removal, soil compaction and resultant erosion.
						Potential for population decrease in sensitive flora and fauna due to poaching and illegal collecting/harvesting.
						Changes in animal behavior patterns due to habitat loss and increased noise levels.
						Increased fishing pressure.

Table 15. Potential impacts for various significant natural areas (continued).

Type of Significant Natural Area[1]	Project Parameter[2]: Area Disturbed	Water Use	Vehicle Traffic	Security	People	Potential Impacts
Geologic Formations (Natural Landmarks)						Increased litter and sanitation problems, attraction of nuisance organisms.
	■	■	■	■	■	N/A
		■	■	■	■	N/A
			■	■	■	N/A
				■	■	N/A
					■	Potential for increased disturbance/defacement of geologic formations and petroglyphy by sample collecting, grafetti, etc.
						Increased litter and sanitation problems.

[1]See Tables 2, 3, and 4 for significant natural inventories.

[2]See Table 5 for potential secondary effects of project parameters.

Table 16. Significant natural areas, long-term disturbance.

HYDROLOGIC SUBUNIT	NO.	APPROXIMATE TOTAL SNA ACRES	APPROXIMATE SNA ACRES DISTURBED	PERCENT
Snake	4	323,000		
Pine	5	52,000		
White	6	0		
Fish Spring	7	18,000		
Dugway	8	0		
Government Creek	9	0		
Sevier Desert	46	12,000		
Sevier/Dry Lake	46A	2,000		
Wah Wah	54	0		
Big Smoky	137A	2,000		
Kobeh	139	31,000		
Monitor	140A	3,600	50	1
Ralston	141	0		
Alkali Spring	142	60		
Cactus Flat	148	22,000		
Stone Cabin	149	1,000		
Antelope	151	0		
Newark	154	0		
Little Smoky	155	2,100		
Hot Creek	156	262,000	1,700	1
Penoyer	170	17,000		
Coal	171	0		
Garden	172	52,000		
Railroad	173	125,000	25	<1
Jakes	174	0		
Long	175	0		
Butte	178	49,000		
Steptoe	179	29,000		
Cave	180	20,000		
Dry Lake	181	9,000		
Delamar	182	0		
Lake	183	2,000		
Spring	184	600,000		
Hamlin	196	45,000		
Patterson	202	4,600		
White River	207	24,000	80	<1
Pahroc	208	0		
Pahranagat	209	8,000		

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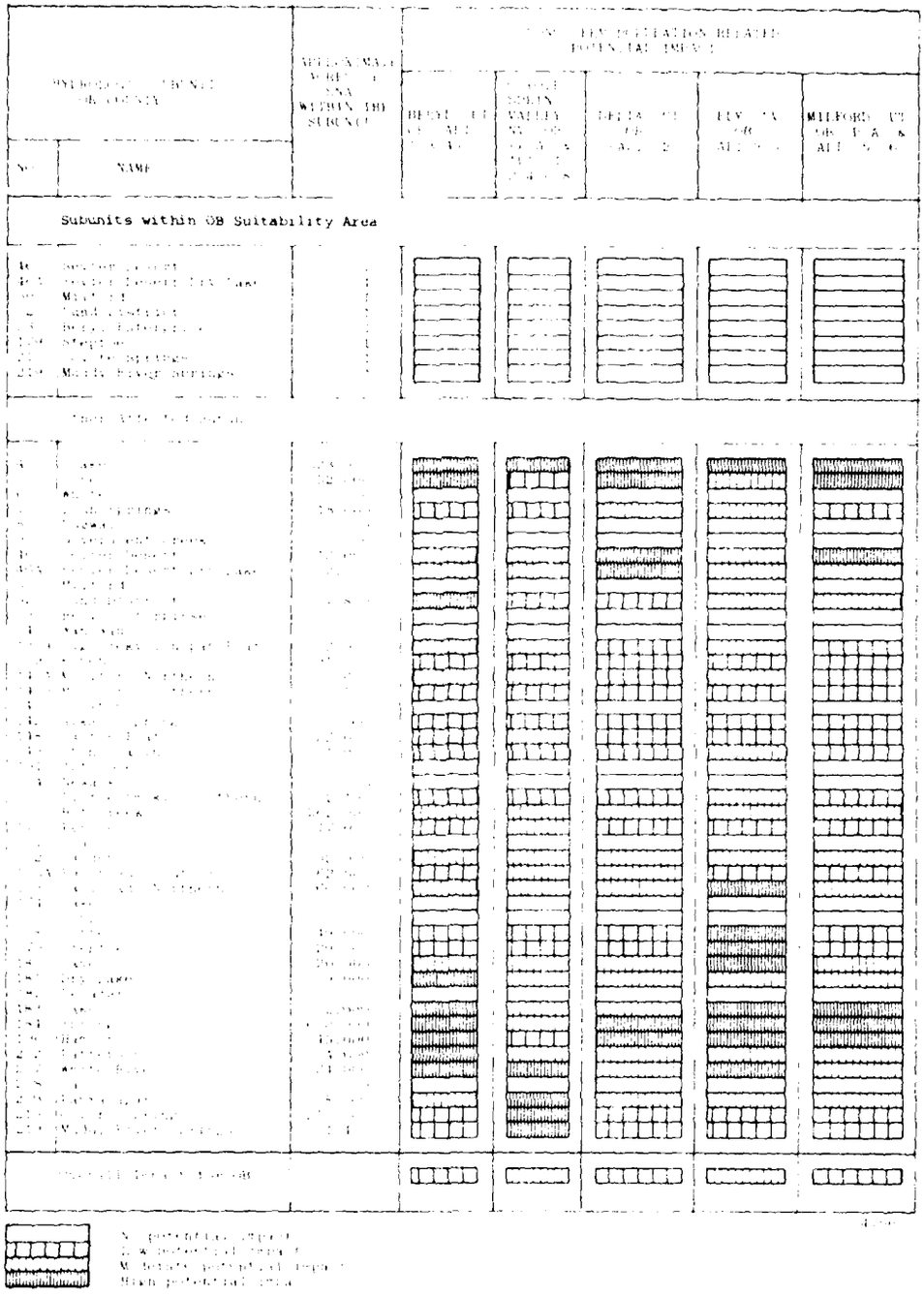
Table 17. Potential population-related impacts to SNAs around operating bases for the Proposed Action and Alternatives 1-6.



A population-related indirect affect index for OB impact analysis was developed using linear distance from the population center and attractiveness of a particular key natural area site. A detailed discussion of the methodology is contained in PTR-6.

Conceptual location of Area Support Centers (ASCs) for Proposed Action and Alternatives 1-6.

GENERAL IMPACTS TO SIGNIFICANT NATURAL AREAS: TEXAS/NEW MEXICO

Proposed or designated natural areas, as well as federal, state, and private parks and reserves may be affected by M-X. This can occur directly, from construction and operation, and indirectly, from increased recreational use. A summary of potential impacts to significant natural areas may be found in Table 15. Because most of the Texas/New Mexico High Plains region is either intensively cultivated or heavily used as rangeland, few remaining natural areas, such as the protected playa lakes and small remnants of undisturbed shortgrass prairie, are of great importance. Several of these lie within the perimeter of the deployment area and are likely to be directly impacted by construction and operation. Buffalo Lake, Muleshoe, and Grulla National Wildlife Rufuges are examples of large playa lakes and surrounding shortgrass prairie used during migration and in the winter by as many as one million waterfowl. Smaller numbers reproduce there. The three national wildlife refuges are adjacent to deployment sites and two of these, Muleshoe and Grulla, are surrounded by shelters. Rita Blanca and Kiowa National Grasslands are managed by the U.S. Forest Service as rangeland. As presently planned, much of both National Grasslands contains proposed deployment sites.

In general, construction would affect all these above-mentioned areas to some extent. Managed rangeland in the National Grasslands will be altered, and part of it will be lost to roadbeds and shelters. The National Wildlife Refuges would not suffer direct alteration, but would be affected by increased noise, dust, and exhaust fumes in the vicinity. Alteration of surface runoff patterns will affect the water supply of the playa lakes. The runoff, due to loss of vegetative cover, would carry higher sediment loads than normal, and could be contaminated by construction-related pollutants, such as oil, grease, and gasoline. Because playa lakes do not drain, these pollutants will accumulate, perhaps to such a level that damage to the food chain could occur. Unless controlled, this type of environmental degradation could render refuges useless or even dangerous to wildlife. Careful planning, including moving deployment sites as far from the refuges as possible, and employing good construction practice including measures to reduce runoff and contain spills, would mitigate much potential damage.

Direct effects of operation would be similar to those noted above for the construction phase, but at far lower intensity levels and therefore, with greatly reduced potential for impact.

Indirect impacts from the work force during construction and operation might be considerable. There will be an increased demand for recreational resources, which will put user pressure on the parks and refuges in and around the area in the National Forest lands to the west. Recreational resources and potential for impacts to them are discussed in ETR-20 land ownership-land use. Increased use of off-road vehicles in both authorized and unauthorized areas could result in loss of habitat through destruction of vegetation, soil disturbances (such as compaction), and in alteration of animal behavior. Disruption of reproduction due to habitat loss, noise, or other forms of interference

would be the most critical effect. Whether these impacts would occur at harmful levels would depend on control of unauthorized activities as well as intensity of legitimate use of available recreational resources.

Table 18 presents a preliminary impact analysis for key natural areas by county. Abundance and sensitivity to impact were evaluated using high, intermediate and low ratings defined as follows:

Abundance

A high abundance rating was accorded those counties with at least one of the following: 1) existing or potential wilderness acreage 2) national wildlife refuge 3) national monument 4) national grasslands. Counties with at least one state park, natural area, natural landmark, or recreation area were regarded as having an intermediate abundance rating, while those counties without key natural areas were considered to be of low abundance.

Sensitivity To Impact

Counties were considered to have a high sensitivity to impact where any portion of an existing or potential wilderness area, national wildlife refuge, national monument, or national grassland is coincident with or directly abutting proposed project features (full basing layout 1617-E). An intermediate rating was given those counties containing key natural areas not directly impacted by the project, and a low rating was accorded those counties with no key natural areas.

Bailey County, Texas is ranked high in sensitivity to impact as it contains Muleshoe National Wildlife Refuge, which is entirely surrounded by shelters. Moore county, Texas, which includes part of Lake Meredith National Recreation Area, is ranked low in sensitivity because the recreation area is distant from the deployment area. Chaves County, New Mexico, contains the designated Salt Creek Wilderness Area within the Bitter Lake National Wildlife Refuge, Bottomless Lakes State Park, and the Corn Ranch Natural Landmark. These are not directly in or adjacent to the deployment area, but are close enought to be impacted indirectly. Chaves County, however, has been given a high sensitivity rating since designated wilderness study area Mescalero Sands is directly abutting project elements in the conceptual layout. Harding and Union counties, New Mexico, contain natural landmarks and national monuments. These are well outside the deployment area, and thus, rate intermediate in sensitivity to impact. Roosevelt County, New Mexico, containing Grulla National Wildlife Refuge, has a high sensitivity index because the deployment area lies directly adjacent to the refuge.

Because the DTN would use existing sectional roads, no additional direct effects of increased access effects are anticipated. The designated operating bases are located at sufficient distances from wilderness and key natural areas, such that direct effects are not anticipated. However, increased population-related indirect impacts are expected to occur.

Table 18. Abundance and sensitivity to impact for key natural areas, Texas/New Mexico High Plains.

STATE/COUNTY	KEY NATURAL AREAS	
	A	S
Texas		
Bailey	H	H
Castro	L	L
Cochran	L	L
Dallam	H	H
Deaf Smith	L	L
Hale	L	L
Hartley	L	L
Hockley	L	L
Lamb	L	L
Lubbock	L	L
Moore	L	L
Oldham	L	L
Parmer	L	L
Potter	I	I
Randall	H	H
Sherman	L	H
Swisher	L	L
New Mexico		
Chaves	H	H
Curry	L	L
De Baca	I	I
Guadalupe	I	I
Harding	H	I
Lea	L	L
Quay	I	L
Roosevelt	H	H
Union	H	I

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A = Abundance
S = Sensitivy to impact
H = High; I = Intermediate; L = Low

Treatment of potential recreation-related impacts may be found in the appropriate discussion sections on recreation, vegetation, wildlife, and aquatic species.

FUTURE TRENDS WITHOUT PROJECT

In the absence of M-X, several activities involving wilderness and significant natural areas may cause significant changes in land use in the Great Basin. The two most likely sources of change in the next 20 years center on the proposed Great Basin National Park Study Area and the BLM wilderness Study Areas. The potential great Basin National Park would attract additional recreationalists into an essentially rural area. Large numbers of these people would need goods and services. The BLM Wilderness Study Area plans for the M-X study area could eliminate as much as 1.8 percent of the entire state from current multiple use. This could have a strong impact on the farms of the region in terms of raising livestock and need for feed. The potential impacts of other significant natural areas will be scaled to expected population growth and should not be excessive.

In the Wilderness Act of 1964 Congress declared its policy "to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." Only Congress can designate a "wilderness area" from federally owned lands, and once an area is so designated it must be administrated in such a manner that the wilderness character is unimpaired and protected. Thus, by statute, identification of an area for wilderness review limits opportunities for development. The Wilderness Act recognizes that certain activities are incompatible with the preservation of wilderness characteristics, and prohibits these activities in wilderness areas (16 U.S.C. 33 (c)):

"Except as specifically provided for in this chapter, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this chapter and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this chapter (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehichles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no struture or installation within any such area."

The Solicitor of the Dept. of Interior in a memorandum (Sept. 5, 1978) to the Secretary of DOI stated that "although Congress has not flatly considered that all developmental activity impairs the suitability of an area for wilderness preservation, it is difficult if not impossible to give meaningful illustrations of types of activities which will or will not impair the suitability of an area for wilderness preservation. For example, commercial timber harvesting has been held both to impair (Parker v. United States, 309 F. Supp. 593 (D. Colo. 1970) and not necessarily to impair (Minnesota Public Interest research Group v Butz, 541 F. 2d 1292 (8th Cir. 1976)) wilderness. The nature of the area and the extent of the proposed activity are the controlling factors."

Under Section 169A of the Clean Air Act (CAA) as amended (42 USC 74a) Congress established as a national goal "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution." Mandatory Class I areas include all national wilderness areas.

On May 22, 1980 the EPA proposed regulations for the visibility protection of federal Class I areas and on July 23, 1980 issued proposed guidelines for state protection of such areas. These proposed regulations will be effective constraints on many stationary industrial sources of air pollution.

A concern of potential wilderness designation is the effects of development and growth. Wilderness and development are by definition mutually exclusive. Potential wilderness located within areas proposed for the M-X program, and development of other projects such as the Intermountain Power Project in Millard County, Utah, an alunite mine and processing plant in Beaver County, Utah, the Anaconda open pit molybdenum mine and mill in Tonopah, Nevada, the proposed White Pine Power plant and possible reopening of the Kennecott Copper Company smelting operation in White Pine County, Nevada, as well as the proposed Allend-Warner Valley Energy System in Utah may pose constraints by reducing land availability. While on the one hand those wildland resources are a constraining factor to future developments, on the other they provide potential recreational opportunities for the people associated with those projects.

Two major federal land-managing agencies control land in the Nevada/Utah study area: the Forest Service and the Bureau of Land Management. The wilderness inventory by the USFS, Roadless Area Review and Evaluation II (RARE II), resulted in designation of two wilderness areas in the project area: Jarbidge Wilderness Area, northern Elko County, Nevada, in the Humboldt National Forest and the Lone Peak Wilderness Area on the border between the Uinta and Wasatch National Forest souteast of Salt Lake City. Current recreational use figures for the Jarbidge Ranger District show a steady increase in total visitor over the last few years: from 7,300 visitor-days in 1975 to 12,300 visitor days in 1979, a 68 percent increase in use. This trend is expected to continue through the next two decades (Davis, 1980). A profile of the users of the Jarbidge Wilderness Area, which makes up about 60 percent of the Jarbidge Ranger District, shows that approximately 55 percent are from Nevada (Las Vegas, Reno, and Elko) and the remaining 45 percent are from out of state with the majority of users from California and Idaho (Wyatt, 1980).

In April 1980 the BLM inventory phase was completed. Two categories of Wildereness Study Areas (WSA) are spelled out BLM recommended and designated WSAs. In the general Nevada/Utah study area approximately 1.5 million acres have been mapped as "recommended" WASs and about 1.6 million acres are "designated" WSAs. These WSAs are scattered throughout the M-X study area. It is impossible to forecast how much of the approximately 3.1 million acres will be withdrawn from the multiple use

category they now occupy and be legally classified as Wilderness Areas. However, if one uses the RARE II analysis as a model, then 24 percent of this potential wilderness acreage could be recommended as wilderness for Congressional designation. This would be an area of about 740,000 acres or an area 10 percent larger than the state of Rhode Island. Also following the RARE II paradigm, 17 percent of the WSAs would be protected for future consideration and possible inclusion. The maximum estimate of possible future wilderness in the Nevada/Utah deployment area would represent an area almost the exact size of Delaware or 1.8 percent of the entire state of Nevada, 960,000 acres.

Another potential change in land status that will have significant effects on the study area is the proposed Great Basin National Park. The park was originally proposed in 1959. In the fall of 1979 the Secretary of the Interior submitted a report on the study of the area for potential inclusion in the National Park System (House Document No. 96-202, Part VI). Of the four areas considered, the Snake Range/Spring Valley Study Area was selected for further study as the choice for the location of the park. The Snake Range/Spring Valley Study Area is an 811,600 acre parcel of land approximately 30 mi east of Ely, White Pine County, Nevada. Field investigations in July 1980 resulted in a draft document on specific park alternatives. The report is to be submitted for appropriate committee and congressional review in December 1980. The fact that the area may be declared a National Park would increase visitation to the area.

For the most part, continued operation of Great Basin significant natural areas such as wildlife refuges, unique and nationally significant wildlife ecosystems, national landmarks, etc. (Table 2) with their specialized audiences will have comparatively little impact on the study area throughout the rest of the century.

In the Texas/New Mexico study area, future use of existing state and national park and forest land is expected to increase proportionally to population growth. New Mexico has plans for opening one new state park approximately 80 miles northwest of Clovis to be named either Santa Rosa or Los Esteros State Park. Texas has no new areas within the study area proposed for acquisition. However, Caprock Canyon State Park in Briscoe County is currently scheduled for full development in the mid 1980s. No other future developments are anticipated in Texas portion of the study area. This topic is discussed more fully in ETR 735 (Recreation). Additional likely action are changes in status of various proposed national landmarks in New Mexico.

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